APPENDIX E- DRAFT FISH AND WILDLIFE COORDINATION ACT REPORT AND BIOLOGICAL OPINION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

March 1, 2001

James C. Duck
Chief, Planning Division
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Duck:

In accordance with the Fiscal Year 1999 Transfer Fund Agreement between the Fish and Wildlife Service (Service) and the U.S. Army Corps of Engineers (Corps), Jacksonville District, the Service is providing the enclosed draft Fish and Wildlife Coordination Act (FWCA) report on the Alternate Test Beach Renourishment Project. The Corps requested an evaluation on the environmental effects of securing and placing fill material on 1.5 miles of public beach, Miami Beach, Florida. This report is submitted in accordance with the Fish and Wildlife Coordination Act of 1956, as amended (16 U.S.C. 661 *et seq.*).

By copy of this letter, the Service is providing an opportunity for the National Marine Fisheries Service, the Florida Fish and Wildlife Conservation Commission, and the Florida Department of Environmental Protection to comment on this draft FWCA report.

If you have any questions, please contact Trish Adams at (561) 562-3909, extension 232.

Sincerely yours,

Robt J. Lee for

James J. Slack
Field Supervisor
South Florida Ecological Services Office

Enclosures

cc:
NMFS, Habitat Conservation Division, St. Petersburg, Florida
NMFS, Protected Resources Division, St. Petersburg, Florida
EPA,West Palm Beach, Florida
FWC, Tallahassee, Florida (Robin Trindell)

FDEP, Tallahassee, Florida (Keith J. Mille)
Miami-Dade County DERM, Miami, Florida (Stephen Blair)
Service, Jacksonville, Florida (Sandy MacPherson)
Service, Raleigh, North Carolina (Tracey Rice)

DRAFT

FISH AND WILDLIFE COORDINATION ACT REPORT

MIAMI-DADE COUNTY BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT

ALTERNATE TEST BEACH RENOURISHMENT MIAMI BEACH, FLORIDA

MIAMI-DADE COUNTY

Submitted to: U.S. Army Corps of Engineers, Jacksonville, Florida
Prepared by: Trish Adams, Project Biologist
Approved by: James J. Slack, Field Supervisor

U.S. Fish and Wildlife Service
South Florida Ecological Services Office
Vero Beach, Florida

March 2001

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EXECUTIVE SUMMARY

The proposed site is located along between 83 rd and 63 rd Streets (DEP monuments R-36 to R-47) in northern Miami Beach, Miami-Dade County, Florida. The total volume of fill is expected to be approximately 600,000 cubic yards and will extend along approximately 1.5 miles of shoreline. Renourishment material will be obtained from an unspecified upland sand source; therefore, dredging offshore will not be required for this project. However, there have been changes with respect to how the material will be transported and deposited on the beach since our preliminary draft Fish and Wildlife Service Coordination Act (FWCA) Report was submitted in September 1999. Comments addressing those changes are provided in this draft FWCA Report. The Service will provide a final FWCA Report after review of the forthcoming Environmental Assessment.

Offshore hard bottom/live rock habitat in the project vicinity is found to be significant, as defined by the Service's Mitigation Policy. Anticipated direct impacts to the offshore hardbottom habitat are restricted to the hardbottom communities within the slurry pipeline corridor. The proposed alignment was identified through habitat surveys to be the least damaging alignment. Actual pipe placement will be micro-sited by Miami-Dade County biologists. Mitigation for unavoidable impacts is targeting in-kind habitat through artificial reef modules at a 1 to 1 square meter footprint ratio. The Service supports this mitigation as proposed. Shore deposition of the sand slurry may affect biological resources, including nearshore hardbottom. Past experience indicates that turbidity is not expected to be generated at the offshore pump station. The Corps of Engineers (Corps) has proposed an extensive turbidity/sedimentation monitoring program that includes monitoring stations throughout the project area. The Service believes the monitoring program, to be conducted by Miami-Dade County, will help protect natural resources in the project area.

The Corps is proposing artificial reef modules, designed in part by Miami-Dade County biologists, for mitigation in this project. The actual additional surface area provided by the reef modules, over and above the base footprint 1:1 mitigation, may provide the additional compensation which would be required through temporal loss calculations. We recommend that the Corps evaluate this scenario, and provide additional mitigation if evidenced by an uncompensated temporal loss.

The Corps has determined that the Biological Opinion dated October 24, 1996, for Region III of the Coast of Florida Erosion and Storm Effects Study includes the project area considered for the proposed renourishment and that the "Reasonable and Prudent Measures" and "Terms and Conditions" apply to the proposed renourishment. The Corps plans to incorporate these requirements into the project plans and specifications and any contracts as appropriate. Service guidance on section 7 Endangered Species Act (ESA) consultations on sea turtles has been revised and has resulted in project specific changes in the "Reasonable and Prudent Measures" and "Terms and Conditions" of the Coast of Florida Biological Opinions (FWCA Report appendix). The Service has provided recommendations for revising the Corps' current sand

specifications in order to ensure suitable beach material is utilized. Continued consultation under section 7 is necessary to address these sand suitability issues as they relate to sea turtles. Additionally, consultation should be initiated for possible effects to any listed species associated with the upland borrow site(s) and sand transport and loading.

Comments regarding the preliminary draft FWCA Report were received from the National Marine Fisheries Service (NMFS), Habitat Conservation Division, on July 14, 2000. In their letter, NMFS included a recommendation to conduct an updated post-Coast of Florida Study benthic survey of the nearshore area to ensure that no hard bottom habitat will be affected. NMFS also expressed concern regarding assurances that sand material will be of suitable quality for beach deposition. Miami-Dade County has not, at this time, undertaken a recent nearshore survey of this project area, but plans to provide this information in the near future (B. Flynn, pers.com. 2001). The Service supports the NMFS concerns.

I. INTRODUCTION

Nourishment of the Atlantic shoreline of Miami-Dade County was authorized by the Flood Control Act of 1968, and referred to as the Beach Erosion Control and Hurricane Protection Project (BEC&HP). The original BEC&HP encompassed approximately 10.5 miles of shoreline extending from Government Cut north to the northern boundary of Haulover Beach Park. The Supplemental Appropriations Act of 1985, and the Water Resources Development Act of 1986 (Public Law 99-662), provided authority for extending the northern limit of the authorized BEC&HP to include the construction of a protective beach along an additional 2.5 miles of shoreline north of Haulover Beach (Sunny Isles) and for periodic renourishment of all the BEC&HP beaches. This authority also provided for the extension of the period of Federal participation in the cost of nourishing the modified BEC&HP from 10 years to 50 years, which is the life of the BEC&HP. The beaches in the City of Miami Beach, Florida, were initially nourished in 1978, renourished in 1980, 1987, 1994, 1997, and scheduled for renourishment again in 2002.

The project, as originally proposed in 1997 by the Corps, called for the use of imported oolitic aragonite as a test of material for use in beach renourishment particularly in areas where offshore borrow sites are nearly exhausted. However, in the Conference Report for FY 1999 appropriations, Congress directed that no funds provided for the Miami-Dade County Project shall be used for the acquisition of foreign source materials for the project unless the Secretary of the Army provides written certification to the Committees on Appropriations that domestic sources of material are not available. Due to these circumstances, the Corps changed the source material from aragonite to an unidentified domestic upland sand source which would be transported and deposited by dump trucks. The Service submitted a preliminary draft Fish and Wildlife Coordination Act (FWCA) Report to the Corps in September 1999. Currently, a revised transportation and deposition plan calls for the material obtained to be transported, loaded and barged offshore where it will be saturated, then pumped through a fixed slurry pipeline to the beach.

The beach in the vicinity of 63rd Street between DEP monuments R-44 to R-46A (a portion of this Alternate Test Beach project) is experiencing accelerated erosion and may not provide hurricane and flood protection of shoreline structures until the scheduled renourishment for this project. As an interim measure, the Corps proposes to renourish this 2,800 feet of shoreline in the vicinity of 63rd Street. Material for the 63rd Street project will be obtained from offshore borrow areas and will be transported through the same slurry pipeline corridor proposed for this project. The Service submitted a final FWCA Report for the 63rd Street project to the Corps in February 2001. The purpose of this draft FWCA Report is to assess the impacts to existing fish and wildlife resources in and adjacent to the Corps proposed beach renourishment. The Service has evaluated the study area and provides comments on project impacts, including recommendations for conservation measures.

II. DESCRIPTION OF STUDY AREA

Miami-Dade County is a heavily populated county on Florida's Atlantic coast and receives a tremendous volume of tourists, particularly during the winter months. Those beaches which can be accessed by the general public are heavily used year round. Those beaches which are associated with condominiums, apartments, and hotels have more restricted access for the general public, but receive use from the many visitors who frequent these facilities as well as those members of the general public who walk or jog along the beachfront.

The beaches in Miami Beach have public access and receive heavy use by swimmers and sunbathers. Adjacent to these beaches are many condominiums and hotels used by long term and short term visitors and residents of the area. Other water related activities within the project area include onshore and offshore fishing, snorkeling, SCUBA diving, wind surfing, and recreational boating. Most of the boating activity in the area originates from either Bakers Haulover Inlet or Government Cut. Both offshore fishing and diving occur on the natural and artificial reefs located within and adjacent to the project area.

III. PROJECT DESCRIPTION

The proposed action is the placement of about 600,000 cubic yards of material along the beach in the northern Miami Beach between 83rd and 63rd street (Figures 1a and 1b). The beach fill would cover approximately 1.5 miles of shoreline from DEP monument R-36 to R-47. The beach will have a berm width of 205 feet from the Erosion Control Line (ECL) at an elevation of +9 feet mean low water (MLW), with a construction tolerance of +/- 0.5 feet. The front slope of the fill will be 1 vertical on 15 horizontal. A 50-foot wide access corridor is proposed for placement of the pipeline to pump sand to the beach (Figure 2).

IV. FISH AND WILDLIFE RESOURCES

Fish and wildlife resources that could be affected by this project include the upper beach zone, which serves as nesting habitat for four species of sea turtles; any nearshore rock outcrops, which could be damaged by placement of the sand-slurry pipeline and/or nourishment material coverage; and offshore coraline reefs, which could be damaged by pipeline scraping or crushing.

A. Community Descriptions

Beach zone

Florida has approximately 744 miles of beaches, mainly along the shorelines of barrier islands. Wind and waves are constantly changing the shape of barrier islands and their beaches. On the east coast of Florida, general patterns of sand transport or littoral drift have been well documented. During winter, net littoral drift is to the south; whereas, during summer, the net transport of sand may retreat slightly to the north if southeasterly winds prevail. Inlets inhibit

littoral drift. As a result, beaches on the up-drift or north side of these inlets accumulate sand, while those on the down-drift side are deprived of this sand.

Florida's beaches function as nesting habitat for four species of federally listed sea turtles: the threatened loggerhead turtle (*Caretta caretta*) as well as the endangered green turtle (*Chelonia mydas*), leatherback turtle (*Dermochelys coriacea*) and hawksbill turtle (*Eretmochelys imbricata*). Approximately 40 percent of all loggerhead nesting occurs in the southeastern United States, primarily in Florida. Nesting beaches in Miami-Dade County experience considerable anthropogenic impacts from public use of the beaches. As a result, Miami-Dade County has initiated a program that relocates nests to more isolated beaches and fenced areas.

The beaches of Miami-Dade County are typical of other Atlantic Coast beaches in Florida that are subject to the full force of ocean waves. Sandy bottom beaches are populated with small, short-lived infauna with high species density and substantial reproductive potential and recruitment. Common species include haustoriid amphipods, decapod crustaceans, bivalves, and spionid worms. These beaches usually have low species diversity, but populations of individual species are often very large. Species such as ghost crabs (*Ocypode quadrata*), mole crabs (*Emerita talipoda*), and polychaetes are highly specialized to survive in this high-energy environment.

Thirteen species of birds nest on Florida's beaches, generally between April and August. All nest on the ground, with the nest consisting of a scrap in the sand. Nesting shorebird populations in Florida have declined due to loss of beach habitat to real estate development. On the remaining few natural nesting beaches, human visitors disrupt nesting birds.

Reefs

Florida is endowed with several reef types: subtropical coral reefs, live bottom communities, nearshore sabellariid worm (*Phragmatopoma lapidosa*) reefs, vermetid reefs, and deep-water *Oculina varicosa* reefs.

Coral reefs are best developed in the United States in south Florida. Most of the Florida Keys' coral reefs are well known due to the clarity of the water and the popularity of SCUBA diving. Farther north, through Miami-Dade and Broward Counties on the east coast and Collier County on the west coast, water clarity and temperature declines, as do reef-building corals. Continuing north, hard corals are fewer, and "live rock" communities are more prevalent. Live rock communities within the project area are populated by sponges, small (ahermatypic) hard corals, tunicates, bryozoans, algae, and sabellariid worms. Live rock communities typically, are also more common in or near the high energy surf zone.

Sabellariid worms can dominate the reef community and form a unique live rock reef type known as "worm rock." These are most often formed in high-energy surf zones particularly between Martin and Brevard counties on the east coast. Such reefs are composed of sand particles loosely

cemented together by a mucus secreted by the worms when building their casing. *Oculina* reefs occur in depths greater than 100 feet and are found from St. Lucie County to Jacksonville. Intertidal vermetid reefs off the Ten Thousand Islands are a remnant of structures formed by the reef-building gastropod, *Petaloconchus* spp.

The reefs of the project area can be classified as live bottom or live rock communities with scattered hard coral. The South Atlantic Fishery Management Council has developed a Fishery Management Plan (FMP) for Coral, Coral Reef, and Live/Hard Bottom Habitats of the South Atlantic Region. Furthermore, damaging, harming, and killing of live rock is prohibited by the current FMP and all harvesting of live rock has been prohibited since January 1, 1996.

The extent of reefs is well known in Miami-Dade, Broward, and Palm Beach counties because the sea floor out to the 60-foot depth contour has been mapped with side-scan sonar by the Corps (Continental Shelf Associates, 1993). Other mapped areas include Venice Beach in Sarasota County, Hutchinson Island in Martin County, and Vero Beach in Indian River County. Nevertheless, with deeper reef areas taken into account, the Service estimates that less than one percent of areas statewide, which may contain live rock communities, have been mapped. Reefs in Miami-Dade County and specifically those reefs east of the proposed beach renourishment are typical of the classical reef profile described for southeast Florida. In addition to any nearshore high energy reef, the inner reef is in approximately 15 to 25 feet of water, the middle patch reef is in about 30 to 50 feet of water, and the outer reef is in approximately 60 to 100 feet of water. The composition of the hardground biological assemblages along Florida's east coast has been detailed by many authors (Goldberg 1970, 1973; Marszalek and Taylor 1977; Continental Shelf Associates, Inc.1984, 1985, 1987, 1993). Although the reefs in the project area and those north of Government Cut support a large variety of hard coral species, these corals are no longer actively producing the reef features seen there. The reef features seen north of Government Cut have been termed "gorgoniod reefs" (Goldberg, 1970; Raymond and Antonius, 1977). Blair and Flynn (1989) described the reefs and hardbottom communities off Miami-Dade County and compared them to the offshore reef communities from Broward and Palm Beach Counties. They documented a decrease in the hard coral species density moving northward from Miami-Dade County to Palm Beach County.

Borrow site

Location of the upland sand source has not been verified at this time.

B. Important Species and Taxa

Epibiota

Reef fauna may be divided into sessile and motile components. The sessile component contains the primary producers, some grazers or first order consumers, planktivores, and filter feeders. Hard corals occupy niches as both producer and consumer. Zooxanthellic algae within coral

polyps photosynthesize while the polyps themselves capture planktonic organisms for consumption. As with the hard corals, carbon fixed far offsite is also concentrated on the reefs by tunicates, sabellariid worms, and sponges. These attached filter-feeding organisms contribute to the organic base by trapping nutrient-rich plankton as it is swept past the reef by wave and wind generated currents. Tunicates, sponges, and sabellariid worms add structure to the reef, providing shelter from predation for the numerous fishes of the reef.

Fishes and motile invertebrates

Fish and motile invertebrates are attracted to the reef by its structure. The numerous crevices, holes, undercut ledges, and epibiotic structure provide these organisms with a refuge from larger predatory fish. The reef also provides a barrier to currents and substrate for attaching demersal eggs. In addition to these features, the sessile organisms of the reef provide a large diverse food base on which some fish species feed directly. Others benefit from this indirectly by feeding on invertebrates and other smaller fish which are nurtured by sessile plant material.

The "food fish" species observed on Miami-Dade County reefs include hogfish *(Lachnolaimus maximus)*, porkfish (*Anisotremus virginicus*), gray snapper (*Lutjanus griseus*), spadefish (*Chaetodipterus faber*), gag grouper (*Mycteroperca microlepis*), and gray triggerfish (*Balistes carpiscus*). Species such as the gray snapper use shallow nearshore reefs as a staging area before recruitment into the offshore commercial and recreational fishery (Stark and Schroeder 1970). All reef fish species are ecologically or scientifically important and some value to recreational divers. Many species are collected for aquariums, such as angelfish (Pomacanthidae), butterflyfish (Chaetodontidae), wrasses (Labridae), damselfish (Pomacentridae) and doctorfish (Acanthuridae).

The spiny lobster (*Panulirus argus*) is the most popular fishery of the nearshore reefs. After spending its early post-larval life stages in estuarine habitats, young lobsters move to the nearshore reefs, where they may spend a good part of their adult lives. Many of these adults move further offshore seasonally (Lyons *et al.* 1981).

Other motile invertebrates include sea urchins, conch, octopus, polychaetes, and decapod crustaceans, which include penaeid shrimp (*Penaeus* spp.), portunid crab (*Portunus* spp.), stone crab (*Menippe mercenaria*), and spiny lobster. Crustaceans consume sessile and epiphytic algae and are, in turn, consumed by higher predators such as grunts (Pomadasydae) and snappers (Lutjanidae) (Odum 1969). Gastropods graze on algae, thereby passing nutrients and energy produced on the reef up the food chain. Predators of gastropods include other invertebrates, such as the spiny lobster.

Sea turtles

Miami-Dade County supports a small percentage (0.6 percent) of Florida's total sea turtle nesting (Meylan *et al.* 1995). Four species are known to nest in Miami-Dade County. The loggerhead

sea turtle constitutes by far the largest percentage (approximately 95%) of Miami-Dade County's total nesting activity, with an average of 400 loggerhead nest constructed each year. Small numbers of green and leatherback turtle nests are also present. The Service believes recommendations based upon the Service's Biological Opinion for the Coast of Florida Study, Region III are valid for this project. A summary of the Reasonable and Prudent Measures of the October 24, 1996 Biological Opinion are: (1) substantial monitoring of compaction will be conducted and appropriate corrective actions will be taken, if needed; (2) relocation of nests will be required during periods of nesting activity; (3) escarpments will be leveled, if they occur; and (4) only beach quality sand suitable for sea turtle nesting shall be used. The Corps plans to incorporate these, with Terms and Conditions, as requirements into the project plans and specifications and any contracts as appropriate. It should be noted that Service guidance on section 7 (ESA) consultations on sea turtles has been revised with minor changes in the Reasonable and Prudent Measures and Terms and Conditions of the Coast of Florida BO (see FWCA Report appendix).

The Service has provided recommendations for revising the Corps' current sand specifications in order to ensure suitable beach material is utilized. Continuing consultation under section 7 is necessary to address these sand suitability issues as they relate to sea turtles. Additionally, consultation should be initiated for possible affects to listed species associated with the upland borrow site(s) and possibly the West Indian manatee, depending on sand transport plans.

V. DISCUSSION

Potential impacts of the proposed beach nourishment include those to the upper beach zone, surf zone, any nearshore high energy reefs, and offshore hardbottom reefs. Impacts may include burial from actual fill placement, burial and suffocation from turbidity generated from surf zone washing of the fill material, burial and suffocation from turbidity generated from transfer of sediment from barge to slurry pipeline, and scarring damage to the hardbottom reefs from the slurry pipeline. Also warranting research and consideration are cumulative effects from past renourishment projects such as changes in beach composition, increased turbidity, and compaction of the existing beach material.

Service Mitigation Policy

In developing the Service's Mitigation Policy (Federal Register 46 (15), Pg. 7656), the definition of mitigation contained in the Council on Environmental Quality's National Environmental Policy Act regulations (40 CFR 1508.20[a-e]) was used. As such, mitigation can include:

1. avoiding the impact all together by not taking a certain action or parts of an action;

2. minimizing impacts by limiting the degree of magnitude of the action and its implementation;

3. rectifying the impacts by repairing, rehabilitating, or restoring the affected environment;

4. reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and

5. compensating for the impact by replacing or providing substitute resources or environments.

This definition recognizes mitigation as a step-wise process that incorporates both careful project planning and compensation for unavoidable losses and represents the desirable sequence of steps in the mitigation planning process. Initially, project planning should attempt to ensure that adverse effects to fish and wildlife resources are avoided or minimized as much as possible. In many cases, however, the prospect of unavoidable adverse effects will remain in spite of the best planning efforts. In those instances, compensation for unavoidable adverse effects is the last step to be considered and should be used only after the other steps have been exhausted.

The Service's Mitigation Policy focuses on the mitigation of fish and wildlife habitat values, and it recognizes that not all habitats are equal. Thus, four resource categories, denoting habitat type of varying importance from a fish and wildlife resource perspective, are used to ensure that the mitigation planning goal will be consistent with the importance of the fish and wildlife resources involved. These categories are based on the habitat's value for the fish and wildlife species in the project area (evaluation species) and the habitat's scarcity on a national, regional or local basis. Resource Category 1 is of the highest value and Resource Category 4, the lowest. Mitigation goals are established for habitats in each resource category.

The mitigation goal for Resource Category 1 habitats is no loss of habitat value since these unique areas cannot be replaced. The goal for Resource Category 2 habitats is no net loss of in-kind habitat value. Thus, a habitat in this category can be replaced only by the same type of habitat (i.e., in-kind mitigation). The mitigation goal for Resource Category 3 habitats is no net loss of overall habitat value. In-kind replacement of these habitats is preferred, but limited substitution of different types of habitat (out-of-kind mitigation) perceived to be of equal or greater value to replace the lost habitat value may be acceptable. The mitigation goal for Resource Category 4 habitats (considered to be of marginal value) is to avoid or minimize losses, and compensation is generally not required.

Priority habitats in the project area include offshore hardbottom reefs within the pipeline corridor and hardbottom reefs which may be present in the vicinity of the barge transfer/pump station. These habitats are considered by the Service to be in Resource Category 2, and no net loss of in-kind habitat value is recommended. However, we consider any significant colonies of hard (stony) coral in this area to be Resource Category 1. Research suggests that two species of brain and star coral grow at a rate of approximately 0.5 centimeters per year (Dodge 1987). Based on this information, we estimate it would take these corals, and likely other hard coral species, at least 100 years to reach 1 meter in diameter.

Existing Beach Composition

Miami-Dade County beaches have experienced several renourishment events since the 1970's which have altered the sand composition of these beaches (T. Rice, pers. com. 2001). Historically, the native beach sand was composed of approximately 70 percent quartz and 30 percent carbonate (T. Rice and L. Charles, pers. com. 2001). Currently, the sand composition is dominated by carbonate with very little quartz. As a result, several problems have been associated with this change, such as increased turbidity which affects reef communities and sand compaction which affects sea turtles. Recent sea turtle nesting data may suggest a trend toward an increase in false crawls which may be attributed to the quality of the sand deposited during the latest renourishment and/or other anthropogenic affects (S. MacPherson, pers. com. 2001).

Upper Beach Zone

The upper beach zone supports ghost crabs, which are common occupants of this zone and are at risk of burial. Limited information describes the crabs ability to "burrow up" to the surface if buried. If populations drop after nourishment takes place, it could be attributed to the emigration of crabs responding to a decreased food supply in the disturbed intertidal (surf) zone rather than from burial mortality (Nelson 1985). The upper beach zone also provides nesting habitat for federally listed sea turtles. Potential impacts to these species include loss of nest, reduced nesting activity, and reduced hatchling survival from sand placement, sand compaction, escarpment formation, and sand color and texture changes. The Biological Opinion dated October 24, 1996, for Region III of the Coast of Florida Erosion and Storm Effects Study includes the project area considered for the proposed renourishment. The "Reasonable and Prudent Measures" and "Terms and Conditions" listed in the Biological Opinion for Miami-Dade County (and revisions) are applicable to the project and the Corps plans to incorporate these requirements into the project plans, specifications, and any contracts, as appropriate.

Surf Zone

The surf zone of the beach supports a diversity of amphipods, polychaetes, gastropods, bivalves, and surf zone fishes. The sand flea or mole crab is one of the more common inhabitants. Many of the surf zone species, because of their weak swimming capabilities, burrowing and/or cryptic nature, will be negatively impacted by the beach nourishment from the sand "dump". New recruitment must come from juveniles or adults which migrate to the area. Increased sediment load may affect the respiration of some species, which could cause suffocation and the loss of these individuals to the system. Information on surf zone fishes is limited but generally states that most fish will flee and avoid the disturbed area and will return within a few months. Outside of lagoons, nearshore hardbottom areas are the primary natural structures in shallow waters of mainland Florida's east coast and were estimated to have nursery value for 34 species of fishes. (Lindeman and Snyder 1998). Nelson (1985) suggest that loss of habitat may be more harmful to fish than suspended sediment loading, which could clog their gills. Most surf zone fish may tolerate an elevated level of turbidity, but burrowing fish are at greater risk from burial.

In general, sandy beaches are populated by small, short-lived organisms with great reproductive potential. As a result, these communities tend to recover quickly from environmental disturbances. The effects of this beach nourishment project on the beach zone fauna will depend primarily on the quality of the nourishment material. If the sand selected to be used for this project meets Corps specifications with Service recommendations, recovery of the beach fauna should occur within one year.

Nearshore High Energy Reefs

Based on reef maps provided in the Coast of Florida Study (Continental Shelf Associates 1993), several small patches of nearshore reef were identified immediately off of the beach. Miami-Dade County plans to conduct visual nearshore surveys in the project area to determine presence and composition of nearshore hardbottom, if still exposed (B. Flynn, pers. com. 2001). Impacts to nearshore high energy reefs, when present, could include direct burial through sand placement and excessive turbidity from washing of the dredged sand. While the fishes, which inhabit these reefs, will avoid adverse effects by leaving the area, the epifauna, which grows on the rocky substrate, will be lost. The affected habitat would include nearly all of the epibenthic organisms (e.g., sponges, bryozoans and stony corals) within the renourishment area. This habitat is unique in that it is located in a dynamic, high energy area. Located in the surf zone, wave action seasonally and intermittently scours the rock, making it available for the settlement of pioneering sessile organisms. The presence of an abundance of these organisms in early life stages provides unique forage opportunities for fishes and invertebrates. Despite frequent scouring, this habitat should be recognized as a valuable fishery resource. The South Atlantic Fishery Management Council's Fishery Management Plan calls for avoiding impacts to this important resource. Where impacts cannot be avoided, the Service recommends mitigation through the creation of similar habitat to that which is lost. Mitigation offsets should, as a minimum, be a ratio of 1 to1 with the addition of a temporal lag multiplier, if appropriate.

Offshore Reefs

Potential impacts to these reefs include scarring damage from the slurry pipeline and burial and, although not anticipated in this project, sedimentation from turbidity generated from barge to the pumping station and pipeline. Little information is available for nourishment impacts in the offshore reef zone. Studies indicate that primary concerns in this zone are that of clogging the gills of resident fish by suspended solids, which may lead to suffocation (Nelson 1985) and the coating of the sessile reef dwelling species. Most mobile pelagic species of fish will leave the work area and return after the work is done. The hard bottom coraline community as a group is the most sensitive community to potential impacts from turbidity generated by the dredging operations and may suffer the greatest impacts from suspended sediments settling onto the reef. Past occurrences of sedimentation damage to reef communities have been documented for renourishment at Sunny Isles in 1988 and at Bal Harbour in 1990. Sediment impacts to the reef during the 1990 incident were though to be caused by the dredge spending a significant amount of time dredging in one confined area between reefs located immediately north and south of the

area dredged. Turbidity generated from offshore operations is normally expected to occur at an offshore borrow site during sand collection. However, this project does not entail offshore material collection, and turbidity generated during barge transport and at the location of barge-to-pipe transfer is not expected to be significant (M. Dupes, pers. com. 2001).

As part of the current project, the Corps is proposing the incorporation of a turbidity monitoring program into the design and construction specifications for the project. The monitoring program should include a series of monitoring stations on appropriate hardbottom reefs and the beach fill sites. The monitoring program will require surveys to be conducted throughout the construction phase of the project to ensure levels of turbidity are maintained below State water quality standards. With the inclusion of this monitoring program in the Corps project design documents, the Service believes that suspended sediments will have minimal impact to natural resources in the project area.

Hardbottom impacts can also include reef scarring from the placement of the slurry pipe line. The pipeline corridor for this project will be the same corridor, and will include the same micro-siting procedures, as the 63rd Street renourishment project. Miami-Dade County conducted an extensive survey of the reef zones to identify the least damaging alignment for the slurry pipeline that would provide suitable access to the nourishment beach. The corridor that was identified produced the least amount of scarring to the offshore reefs (Miami-Dade County 2000). This recently completed alignment survey provided the proposed location of the 63rd Street slurry pipeline. The alignment assumes a pipeline footprint width of 0.25 meters (m) along the entire path over the reef. The estimated amount of reef damage is 311 m^2. The potential pipeline contact path is projected to include 532 hard corals, 2,637 soft corals, and 2,329 sponges. As past projects have shown, the pipeline will not be in contact with the reef along the entire path. Variability of bottom relief and permit required pipeline "collars" serve to support the pipeline for considerable distances, thus dramatically reducing the area of physical contact between the pipe and the reef. Actual impacts from several recent projects have been shown to be between 18% and 83% of full pathway projection. Therefore, mitigation will be calculated post-construction. Mitigation for pipeline damage from the initial placement for the 63rd street project will consist of artificial reef modules designed with concrete and limerock. The modules will be placed nearby at a 1:1 area of impact to base area of module ratio. With a 5 ft. by 9 ft. base area, one module per 5 m^2 of hardbottom impacts will be required. Due to the approximate 6:1 surface area to base area of these modules being substantially greater than impact surface area, we expect the actual mitigation habitat substrate ratio to be more akin to 2:1. Placement of the pipeline again (pipeline will not remain in place between projects) for the Alternate Test Beach project will likely incur some additional unavoidable reef impacts within the corridor, and mitigation proposed is expected to be similar in design.

The Service at present supports this mitigation scope and design, as exemplified by 63rd Street plans, but recommends that the Corps include a temporal lag factor in the mitigation ratio. The temporal lag factor accounts for the time lag in establishing a functional, viable hardbottom community that is comparable to the community impacted by the pipeline scarring. We

recommend that the Corps research a temporal factor, incorporating a functional equivalency assessment, for insertion in mitigation calculations, for ratio/quantification evaluation here and in future projects. The Service recommends Habitat Equivalency Analysis: An Overview (NOAA, Damage Assessment and Restoration Program, 1995) as one reference. Another reference, based on this concept, is the Temporal Lag Table found in Section 5c of the Corps sponsored Joint State/Federal Mitigation Bank Review Team Process For Florida (October 1998).

Borrow Site: Upland Sand Specifications

The Corps proposes this project as a "test beach" to assess the feasibility, physically and fiscally, of obtaining beach compatible material from alternative sources, since offshore borrow sites are nearly exhausted. Initially, this included the use of aragonite obtained from the Bahamas and currently, obtaining sand from a domestic upland sand source. The Corps has generated generic sand specifications for contractors to use as a guide during the site selection and bid process. The contractor will be required to obtain the appropriate beach compatible material from an upland sand source, deliver, and place the material on the beach. As indicated in the sand specifications, the sand supplied will be natural; however, it may be processed or blended provided a blending plan is submitted/approved. Plans do not support manufactured sand (e.g. limestone quarried then crushed to meet specifications). Offshore material will not be accepted. Refer to the Corps' sand specifications in this FWCA Report appendix (Beach Fill). A summary of the physical specifications of material and borrow site requirements is as follows:

1. 99% of the material must pass through a # 3/8 sieve (9.51 mm) and shall contain no material larger than a # 3/4 sieve (19.00 mm).
2. The average mean grain size required is 0.30 mm, but not exceed 0.55 mm.
3. Sand will be composed of quartz and/or carbonate with no more than 20 percent sand of other mineralogical composition.
4. Silt content of less than 5 percent [passing #200 sieve (.074)].
5. Phi Standard Deviation values from 0.50 phi to 1.75 phi.
6. Free of debris, sharp rocks and pebbles, concrete rubble, clay, and organic material.
7. Sand color shall be similar to the existing beach and within the range on the Munsell Soil Color chart- Hue: 2.5 YR; 5 YR; 7.5 YR; 10 YR; 2.5 Y; 5 Y; Chroma: 1, 2, or 3; Value: 6, 7, or 8.
8. Phase 1 Hazardous Toxic and Radioactive Waste (HTRW) Evaluation will be conducted at the potential borrow sites to insure the material does not contain hazardous material. If acceptable, the material will be tested further for radioactive isotopes and various other environmental contaminants.

Threatened and Endangered Species

The Service agrees that the project falls within the boundaries of the Coast of Florida Biological Opinion. However, due to unknown sand source and questionable sand specifications for this project, the Service, at this time, cannot assess potential effects on listed sea turtles. The upland

sand source may not be in adherence with the Reasonable and Prudent Measure of the BO, which addresses beach quality sand and its suitability for sea turtles, from nesting to hatchling emergence. The Service has provided recommendations for revising the Corps' current sand specifications in order to ensure suitable beach material is utilized.

Continued consultation under section 7 is necessary to address sand suitability issues as they relate to sea turtles. Additionally, consultation should be initiated for possible effects to listed species which may be associated with the upland borrow site(s) and, depending on sand transportation routes, for the West Indian manatee. Areas identified as Alternative Sand Source Locations in the Coast of Florida Study EIS (Pg. EIS-25) indicate quarries may be located in environmentally sensitive areas, such as the Lake Wales Ridge.

VI. RECOMMENDATIONS

Sand Specifications

During review of the upland sand source specifications, the Service has identified several concerns and requests the following:

1. Upland material should be compared to the historic natural native beach, not the material currently existing on the beach which remains from previous nourishment activities;

2. Clarify mean grain size by including the sorting coefficient in the discussion;

3. Specify that quarried limestone crushed to meet grain size specifications is prohibited. The term "manufactured" is confusing;

4. Turbidity issues and concerns can be addressed by including the following:

   (a) Remove the words "whole or" in the shell fragments to describe acceptable shells. Whole shells that are sand-sized are very fragile, break down easily and produce mud. These "whole" shells are not durable, and the shells should be defined as fragments of mollusk shells, and excluding Halimeda, benthic foraminifera, etc. These quiet-environment "shells", break down very easily on a high energy beach.

   (b) Test carbonates for durability by requiring a tumbling barrel test with quartz included in the barrel, to simulate abrasion on the beach itself. Evaluate the remaining material.

   (c) Prior to transportation the material should be wet separated at the quarry site to wash out 90% of the fine material that are less than 200 microns in size. Utilization of on-site retention ponds should greatly reduce turbidity during and post-construction.

(d) Modify the sieving requirements to specify that they be wet sieved, with the tap water (not distilled water) retained, decanted, dried and weighed so there is an accurate percentage of muds calculated. Carbonate muds when dry will sieve as grains and not as mud.

(e) Require a settling tube analysis be conducted with the sieving analysis. This would show whether the non-quartz grains settle like quartz of the same size. The tube should be calibrated to quartz grains at 20 microns vs. the 62 micron standard. Sediments less than 20 microns are more likely to remain in suspension longer and are easily re-suspended.

(f) Require a final 0.5 or 1.0% silt content equal to or less than 20 microns as opposed to the 5% in the current specifications; this may be achieved if the above recommendations are implemented.

5. Restore a quartz dominated beach by limiting the percent carbonate to 30% to reflect the historic native beach composition.

6. Add the #35 sieve (0.50 mm) to the sediment sieve analysis to give more precise grain size distribution.

7. Prior to the final site selection of the upland sand source, the Service requests to review the sediment data obtained from the candidate sites. In addition, the Service requests the opportunity to provide our recommendations and site preference.

The Service also has concerns regarding possible contamination issues present at the borrow site. The Corps has required contractors to conduct a Phase 1 Hazardous Toxic and Radioactive Waste Evaluation at the potential borrow sites to insure the material does not contain radioactive materials or other environmental contaminants.

Reduction of Adverse Effects

The Corps has discussed with the Service specific measures in the specifications of the project that, if implemented, should reduce adverse environmental effects of the proposed project. These actions are as follows:

1. The Service has expressed concerns with the potential effects from turbidity on nearshore and off shore hardbottom reefs generated by the sediment transfer and by sediment placement on the beach. The Corps has proposed a turbidity monitoring program (Miami-Dade County 2000) that will monitor the levels of turbidity generated by the proposed nourishment and will provide corrective protocols to protect the nearshore and offshore reefs.

2. The Service has expressed concerns with the potential effects from the slurry pipeline placement across portions of the offshore reefs between the pumping station and the nourishment beach. The Corps has identified a preferred pipeline route for both 63rd Street and Alternate Test Beach projects, though a study prepared by Miami-Dade County (2000) that minimizes reef impacts and includes coral relocation and mitigation for post-construction verified impacts. The Service will need to evaluate mitigation specific to this project, which should be contained in the forthcoming Environmental Assessment. Assuming similar mitigation and monitoring plans, mitigation will include the nearby placement of concrete/limerock reef modules at the ratio of one module per 5 m^2. Miami-Dade County divers will micro-site actual pipeline placement. Hard corals should be avoided or relocated, especially those requiring 50 to 100 years to reach diameters of 0.5 to 1 meter. Tractor tires will be used as elevation collars. It is also our understanding that buoy cables, such as those responsible for reef damage in a previous area project, will be removed after pipeline placement in order to avoid this problem.

Nearshore Reef

A survey, as proposed by Miami-Dade County DERM and targeting characterization and extent of nearshore resources, including hardbottom, should be submitted to the Service. If resources are present, the Service recommends that the Corps provide plans for avoidance, minimization, and mitigation of impacts.

Mitigation

The Corps should research a temporal factor, incorporating a functional equivalency assessment, for insertion in mitigation calculations, for ratio/quantification evaluation here and in future projects. The Service recommends Habitat Equivalency Analysis: An Overview (NOAA, Damage Assessment and Restoration Program, 1995) as one reference. Another reference, based on this concept, is the Temporal Lag Table found in Section 5c of the Corps sponsored Joint State/Federal Mitigation Bank Review Team Process For Florida (October 1998). The Service will assist in this initiative.

Long-term Research Needs

1. Research is needed in addressing possible cumulative secondary environmental impacts from the repeated transfer of offshore silt to the nearshore benthic system along the coast of south Florida, for the evaluation of future projects and sand source selection.

2. Additional evaluations of the biological, physical, and chemical recovery of offshore sand borrow areas in general are needed for evaluation of future projects and sand source selection.

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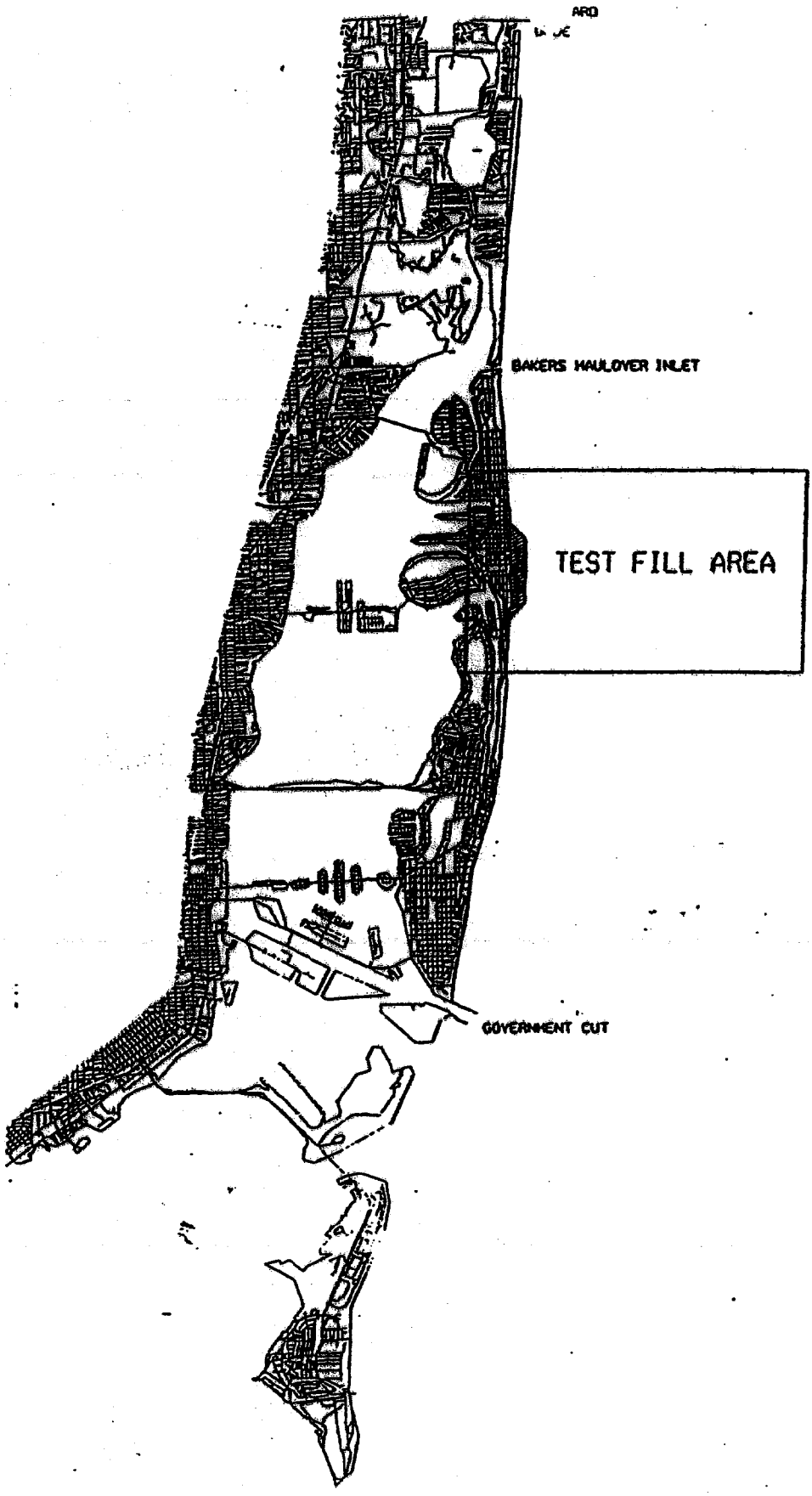
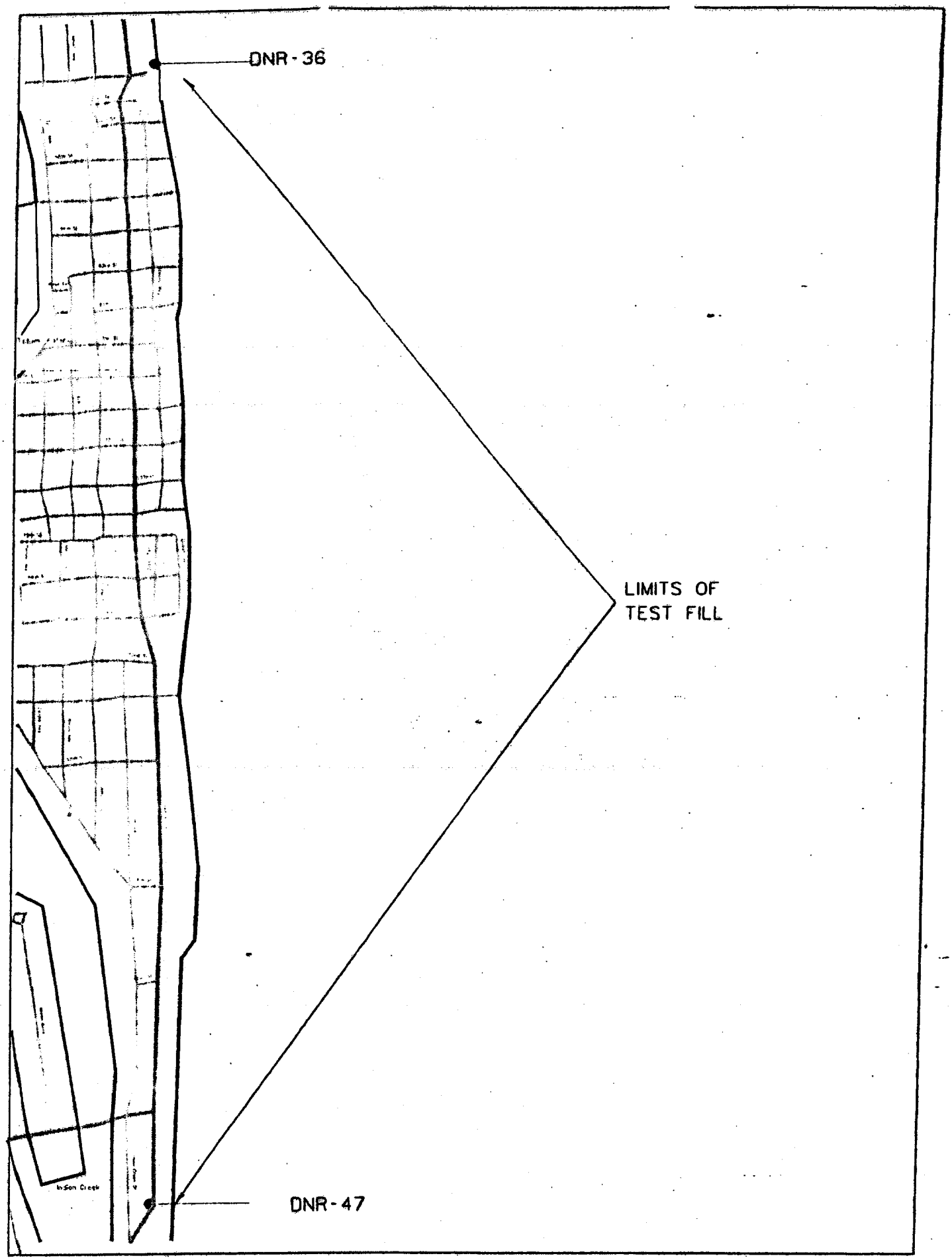
FIGURES

Figures



DADE COUNTY TEST FILL SITE

FIGURE 1a



SUSTAINABILITY OF RENOURISHMENT
MIAMI BEACH TEST FILL

Figure 16

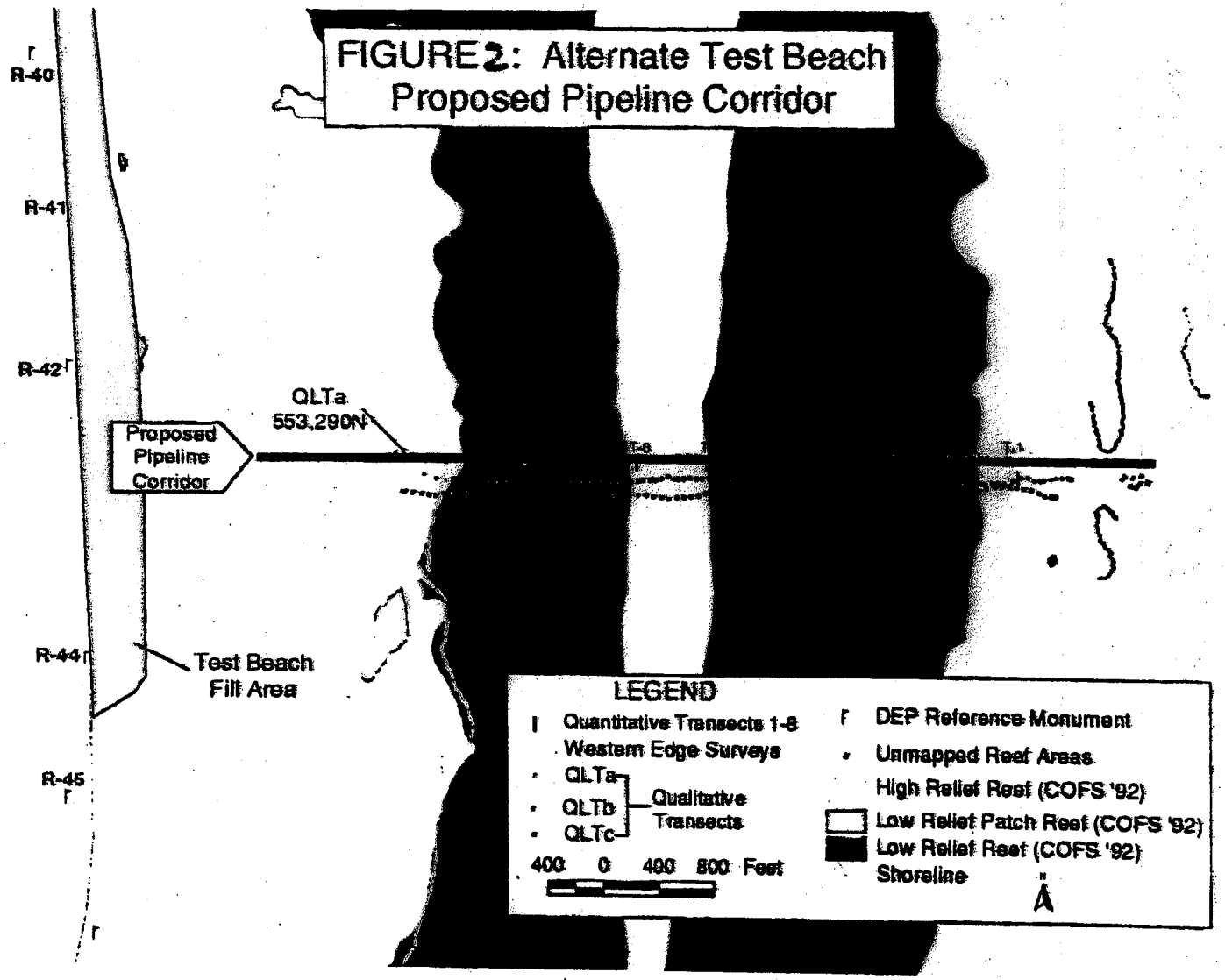


FIGURE 2: Alternate Test Beach
Proposed Pipeline Corridor
R-40
R-41
R-42
R-44
R-45
QLTa
553,290N
Proposed
Pipeline
Corridor
Test Beach
Fill Area
LEGEND
Quantitative Transects 1-8
Western Edge Surveys
QLTa
QLTb
QLTc
Qualitative
Transects
400 0 400 800 Feet
DEP Reference Monument
Unmapped Reef Areas
High Relief Reef (COFS '92)
Low Relief Patch Reef (COFS '92)
Low Relief Reef (COFS '92)
Shoreline
N

APPENDICES

United States Department of the Interior

FISH AND WILDLIFE SERVICE
P.O. Box 2676
Vero Beach, Florida 32961-2676

October 24, 1996

IN REPLY REFER TO

Colonel Terry Rice
District Engineer
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Attn: Planning Division

FWS Log No.: 4-1-96-F-268
Project: Coast of Florida Study, Region III

Dear Colonel Rice:

The U.S. Fish and Wildlife Service (FWS) has reviewed the draft Feasibility Report for the Coast of Florida Erosion and Storm Effects Study, Region III submitted by the U.S. Army Corps of Engineers (COE). This letter represents the FWS' biological opinion on the effects of the planned actions within this report in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (ESA). Effects of the planned actions on other resources such as nearshore reefs remain to be addressed in accordance with section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. *et seq.*).

This biological opinion programmatically addresses beach nourishment and renourishment in Region III. According to the COE's Biological Assessment (BA), separate biological opinions will be prepared for individual projects at a more advanced planning stage. This biological opinion is based on information provided from the following sources: the Feasibility Report, which includes a draft Environmental Impact Statement (DEIS), the BA for the Coast of Florida Study, Region III, from the Florida Department of Environmental Protection (FDEP), from Palm Beach, Broward, and Dade Counties, field investigations, previous biological opinions prepared for similar actions in the action area as well as other published and unpublished sources of information. A complete administrative record of this consultation is on file in the FWS' South Florida Ecosystem Office in Vero Beach, Florida.

CONSULTATION HISTORY

On October 5, 1995, the COE provided the FWS with a BA and a letter requesting formal consultation on threatened and endangered sea turtles as a result of the proposed actions associated with the Coast of Florida Study, Region III.

In a letter dated February 14, 1996, the FWS requested from the COE an estimate of the number of proposed projects which could be constructed within a single year. In this letter, the FWS notified the COE that formal consultation could not be initiated without this information.

In a letter dated March 28, 1996, the COE provided the FWS with the information requested above.

On July 9, 1996, the FWS notified the COE that the information provided is sufficient, formal consultation is initiated, and a biological opinion would be provided by August 23, 1996.

In August 1996, a revised DEIS for the Coast of Florida Study was received by the FWS.

BIOLOGICAL OPINION

Description of the proposed action

The Feasibility Report summarizes the COE's cooperative, cost-shared feasibility study on beach erosion and storm damage problems of the Atlantic Ocean shoreline along the southeast coast of Florida. The COE proposes to construct 27 shore protection projects consisting of beach nourishment, beach renourishment and sand transfer (See Table 1). These project segments span 93 kilometers of shoreline in Palm Beach, Broward and Dade Counties. Thirteen of these 27 projects have been previously authorized as Civil Works projects. Fourteen of the projects will require Congressional authorization.

Table 1. Project Plans Proposed in the Coast of Florida Study, Region III

Project Name	Project Type	Status
Bakers Haulover Inlet	0.1 Km Sand Transfer	New Project
Bal Harbour, Surfside, Miami Beach	14.3 Km Renourishment	Authorized Project
Boca Raton	2.3 Km Renourishment	Authorized Project
Dania Beach	1.0 Km Renourishment	New Project
Deerfield Beach	7.2 Km Renourishment	New Project
Delray Beach	4.3 Km Renourishment	Authorized Project
Fort Lauderdale	1.1 Km Renourishment	New Project
Golden Beach	1.8 Km Renourishment	New Project
Government Cut	0.3 Km Jetty Tightening	New Project
Highland Beach	5.1 Km Renourishment	New Project
Hillsboro Inlet	0.3 Km Sand Trap	New Project
Hollywood\Hallandale	8.5 Km Renourishment	Authorized
John U. Lloyd	3.7 Km Renourishment	Authorized
Jupiter\Juno Beach	4.8 Km Renourishment	Authorized Project
Key Biscayne	5.2 Km Renourishment	Authorized Project
Lake Worth Inlet	0.9 Km Sand Transfer	New Project
N. Palm Beach Island	1.0 Km Renourishment	Authorized Project
Ocean Ridge	2.4 Km Renourishment	Authorized Project
Palm Beach Island	4.3 Km Renourishment	Authorized Project
Pompano\Lauderdale by the Sea	8.5 Km Renourishment	Authorized
Port Everglades	.3 Km Sand Transfer	New Project
Port Everglades	Spur and Breakwater	New Project
Riviera Beach	1.7 Km Groin or Breakwater	New Project

Table 1. Project Plans Proposed in the Coast of Florida Study, Region III

Riviera Beach	2.7 Km Dune	New Project
S. Palm Beach Island	4.8 Km Renourishment	Authorized Project
So. Lake Worth Inlet	0.4 Km Sand Transfer	New Project
Sunny Isles (Haulover Beach)	4.0 Km Renourishment (2.5 miles	Authorized Project

Action Area

The action area for this Biological Opinion includes all shoreline where fill is proposed to be deposited or removed for transfer across an inlet, which amounts to 36 km of shoreline in Palm Beach County, 34 km in Broward County and 26.6 km in Dade County.

The COE has determined that the planned actions in the Coast of Florida Study, Region III may affect sea turtle nesting. Our records indicate that the threatened loggerhead sea turtle (*Caretta caretta*), as well as the endangered green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*) and hawksbill sea turtle (*Eretmochelys imbricata*), nest on the beaches in Palm Beach, Broward, and Dade Counties.

Status of the species

The FWS has responsibility for protecting sea turtles when they come ashore to nest. The National Marine Fisheries Service (NMFS) has responsibility over sea turtles in the marine environment. In applying the jeopardy standard under the ESA, the FWS has determined that sea turtle species occurring in the U.S. represent populations that qualify for separate consideration under section 7 of the ESA. Therefore, even though sea turtles are wide-ranging and have distributions outside the U.S., the FWS only considers the U.S. populations of sea turtles when making jeopardy or no jeopardy determinations under section 7.

The reproductive strategy of sea turtles involves producing large numbers of offspring to compensate for the high natural mortality through their initial years of life. For at least two decades, several human-caused mortality factors have contributed to the decline of sea turtle populations along the Atlantic coast and in the Gulf of Mexico (National Research Council 1990a). These factors include commercial over-utilization of eggs and turtles, incidental catches in commercial fishing operations, degradation of nesting habitat by coastal development, and marine pollution and debris. Therefore, human activities that affect the behavior and/or survivability of turtles on the remaining nesting beaches, particularly the few high density nesting beaches, could seriously reduce our ability to protect sea turtles.

Loggerhead sea turtle

The loggerhead sea turtle, which was listed as a threatened species on July 28, 1978 (43 FR 32800), inhabits the continental shelves and estuarine environments along the margins of the Atlantic, Pacific, and Indian Oceans. Loggerhead sea turtles nest within the continental U.S. from Louisiana to Virginia. Major nesting concentrations in the U.S. are found on the coastal islands of North Carolina, South Carolina, and Georgia, and on the Atlantic and Gulf coasts of Florida (Hopkins and Richardson 1984). Total estimated nesting in the southeastern U.S. is approximately 50,000 to 70,000 nests per year (NMFS and FWS 1991b).

From a global perspective, the southeastern U.S. nesting aggregation is of paramount importance to the survival of the species and is second in size only to the population that nests on islands in the Arabian Sea off of Oman (Ross 1982, Ehrhart 1989, NMFS and FWS 1991b). The status of the Oman colony has not been evaluated recently, but its location in a part of the world that is vulnerable to disruptive events (e.g., political upheavals, wars, catastrophic oil spills) is cause for considerable concern (Meylan *et al.* 1995). The loggerhead nesting aggregations in Oman, the southeastern U.S., and Australia account for about 88 percent of nesting worldwide (NMFS and FWS 1991b). About 80 percent of loggerhead nesting in the southeastern U.S. occurs in six Florida counties: Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward (NMFS and FWS 1991b).

Recent genetic analyses using restriction fragment analysis and direct sequencing of mitochondrial DNA have been employed to resolve management units among loggerhead nesting cohorts of the southeastern U.S. (Bowen *et al.* 1993; B.W. Bowen, University of Florida, Gainesville, in litt., November 17, 1994, and October 26, 1995). Assays of nest samples from North Carolina to the Florida Panhandle have identified three genetically distinct nesting populations: (1) northern nesting population - Hatteras, North Carolina, to Cape Canaveral, Florida; (2) South Florida nesting population - Cape Canaveral to Naples, Florida; and (3) Florida Panhandle nesting population - Eglin Air Force Base and the beaches around Panama City, Florida. These data indicate that gene flow between the three regions is very low. If nesting females are extirpated from one of these regions, regional dispersal will not be sufficient to replenish the depleted nesting population (Bowen *et al.* 1993, B.W. Bowen, University of Florida, Gainesville, in litt., October 26, 1995).

Green sea turtle

The green sea turtle, which was listed as an endangered species on July 28, 1978 (43 FR 32800), has a worldwide distribution in tropical and subtropical waters. Major green sea turtle nesting colonies in the Atlantic Ocean occur on Ascension Island, Aves Island, Costa Rica, and Surinam. Breeding populations of the green sea turtle in Florida and along the Pacific coast of Mexico are listed as endangered; all other populations are listed as threatened.

Within the U.S., green sea turtles nest in small numbers in the U.S. Virgin Islands and Puerto Rico, and in larger numbers along the east coast of Florida, particularly in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties (NMFS and FWS 1991a). Nesting also has been documented along the Gulf coast of Florida on Santa Rosa Island (Okaloosa and Escambia Counties) and from Pinellas County through Collier County (FDEP, unpublished data).

Green sea turtles have been known to nest in Georgia, but only on rare occasions (Georgia Department of Natural Resources, unpub. data) and they nest sporadically in North Carolina (North Carolina Wildlife Resources Commission, unpublished data). No green sea turtle nesting has been documented in South Carolina (S. Murphy, South Carolina Department of Natural Resources, in litt., November 8, 1995). Unconfirmed nesting of green sea turtles in Alabama has been reported (R. Dailey, Bon Secour National Wildlife Refuge, personal communication).

Leatherback sea turtle

The leatherback sea turtle, which was listed as an endangered species on June 2, 1970 (35 FR 8491), is found in the Atlantic, Pacific and Indian Oceans. Leatherback sea turtles have been recorded as far north as Labrador and Alaska and as far south as Chile and the Cape of Good Hope. Nesting grounds are distributed circumglobally, with the Pacific Coast of Mexico supporting the world's largest known

concentration of nesting leatherbacks. The largest nesting colony in the wider Caribbean region is found in French Guiana, but nesting occurs frequently, although in lesser numbers, from Costa Rica to Columbia and in Guyana, Surinam, and Trinidad (NMFS and FWS 1992, National Research Council 1990a).

Leatherback sea turtles regularly nest in the U.S. in Puerto Rico, the U.S. Virgin Islands, and along the Atlantic coast of Florida as far north as Georgia (NMFS and FWS 1992). Leatherback turtles have been known to nest in Georgia and South Carolina, but only on rare occasions (Georgia and South Carolina Departments of Natural Resources, unpublished data). Leatherback nesting also has been reported on the west coast of Florida on St. Vincent National Wildlife Refuge (LeBuff 1990), St. Joseph Peninsula State Park (FDEP, unpublished data), and St. George Island (T. Lewis, St. Vincent National Wildlife Refuge, personal communication); a false crawl (non-nesting emergence) has been observed on Sanibel Island (LeBuff 1990).

Hawksbill sea turtle

The hawksbill sea turtle, which was listed as an endangered species on June 2, 1970 (35 FR 8491), is found in tropical and subtropical seas of the Atlantic, Pacific, and Indian Oceans. The species is widely distributed in the Caribbean Sea and western Atlantic Ocean. Within the continental U.S., hawksbill sea turtle nesting is rare and is restricted to the southeastern coast of Florida (Volusia through Dade Counties) and the Florida Keys in Monroe County (Meylan 1992, Meylan *et al.* 1995). Hawksbill tracks are difficult to differentiate from those of loggerheads and may not be recognized by surveyors. Therefore, surveys in Florida probably underestimate actual hawksbill nesting numbers (Meylan *et al.* 1995). In the U.S. Caribbean, hawksbill nesting occurs on beaches throughout Puerto Rico and the U.S. Virgin Islands (NMFS and FWS 1993).

ENVIRONMENTAL BASELINE

Status of the species in the action area

A. Nesting within Region III compared to nesting statewide

The following discussion of sea turtle nesting within Palm Beach, Broward, and Dade Counties, as well as comparisons to statewide nesting trends, was derived from data provided by Meylan *et al.* (1995) and Meylan (unpublished data). Meylan *et al.* (1995) tabulates the results of nesting surveys throughout Florida between 1979 and 1992. Unpublished data are available for the 1993 and 1994 nesting seasons.

Approximately 25 percent of Florida's sea turtle nesting occurs annually in the tri-county area known as Region III. During the nesting seasons from 1979 to 1992, loggerhead sea turtles laid 21.8 percent of their nests within Region III; green sea turtles laid 28.4 percent; and leatherbacks laid 34.7 percent. Hawksbill sea turtles reportedly laid 64 percent of their nests on Region III beaches; however, total nesting activity was low (11 nests state-wide) and this high percentage could be due to factors other than regional nesting preference.

Statewide and within Region III of the Coast of Florida Study, loggerhead sea turtle nests account for the vast majority of reported nesting (97.9 and 95.1 percent, respectively, from 1979 to 1992). During this same period, green sea turtle nests amounted to 0.2 percent of nesting state-wide and 4.2 percent within Region III. Nesting totals for each species differ substantially. From 1988 to 1992, while survey efforts remained relatively constant, the total number of reported loggerhead nests state-wide fluctuated between

37,242 and 68,614. Green sea turtle nests were reported to fluctuate between 455 and 2,509 during the same period. While totals differ, the distributions of loggerhead and green sea turtle nests follow a similar pattern on the east coast of Florida.

The most nesting activity by both species occurred outside of the action area to the north in Brevard County. Loggerhead and green sea turtles laid 39.4 percent and 39.3 percent, respectively, of their nests in Brevard County. Palm Beach County supported the second highest percentage of nests for both species with 17.8 percent of loggerhead nests and 23.1 percent of green sea turtle nests.

Broward County was sixth in importance as a nesting location for both species. Loggerhead sea turtles laid 3.4 percent of their nests here between 1979 and 1982 and green sea turtles laid 5.0 percent of their nests in Broward County during the same period. Dade County had a small but significant proportion of nests (0.6 for loggerheads and 0.3 for greens) from 1979 to 1992.

Between 1988 and 1992, annual reported leatherback sea turtle nests varied between 98 and 188 state-wide. The distribution of these nests differs from the loggerhead and green sea turtle nests discussed above. Leatherback nests have a center of distribution at Palm Beach County which supports more than half (50.1 percent) of the total nests reported state-wide. To the north, Martin and St. Lucie County beaches have been the site of 27.7 percent and 13.2 percent of leatherback nests, respectively. South of Palm Beach County, the number of leatherback nests declines more sharply. Broward County supported 3.0 percent of leatherback nesting and Dade County supported 1.6 percent.

The hawksbill sea turtles nest so rarely in Florida (only 11 nests reported state-wide from 1979 to 1992) that no distinct pattern of distribution is apparent. However, the majority (7) of those reported nestings have occurred within the Region III area. One hawksbill nest was reported from Palm Beach County in 1985 and two in 1992, one in Broward County in 1986, and one in 1981 and two in 1990 in Dade County.

B. Nesting within Region III

The average number of nests annually of each species within each Region III county are shown in Table 2. These data show that Palm Beach County is clearly the most important nesting location within the region for the endangered leatherback and green sea turtles. Less evident from Table 2 is the fact that as the total number of nests for these species declines from north to south, so too does the percentage that these nests contribute to total nesting activity. Green sea turtles lay 4.3 percent of total nests in Palm Beach and Broward Counties, but only 0.5 percent of the total in Dade County. Similarly, leatherback nests constitute 0.8 percent of the total in Palm Beach County but only 0.4 and 0.5 percent in Broward and Dade Counties, respectively.

Table 2. Average annual number of nests by county from 1992 to 1994

	Loggerhead	Green	Leatherback	Hawksbill
Palm Beach	12,133	544	99	1
Broward	2,226	101	11	0
Dade	401	2	2	0

C. Nesting activity trends in Region III

Throughout the state, the number of sea turtle nests (all species) per kilometer surveyed from 1979 to 1992 appears to have increased slightly. Loggerhead nest numbers vary enough from year to year to prevent Meylan *et al.* (1995) from drawing a firm conclusion that loggerhead nesting is increasing (see Figure 1). Kilometers surveyed increased as the study progressed, thus, the figures become increasingly reliable. It appears that loggerhead nesting activity could be on a four year cycle. Figure 1 shows peaks in nesting density for 1982, 1986, and 1990. Similarly, green sea turtle nesting exhibits a two year cycle in activity.

A trend toward increasing loggerhead nesting within Region III appears more evident as seen in Figure 2. The contribution from each county to each year's loggerhead nesting activity can be approximated by reviewing Table 2. All counties have a similar trend.

Dissimilar trends in green sea turtle nesting among Palm Beach, Broward, and Dade Counties occurred from 1979 to 1994. Nesting activity for each year by county is shown in Figure 3. The figure above shows a pronounced increase in green sea turtle nesting in Palm Beach County from 1990 to 1994. The phenomenon of higher nesting activity in alternating years can easily be seen in the years 1990, 1992, and 1994. This pattern can also be seen in the Broward County data. The trend toward increasing green sea turtle nesting activity over the long term is also clear from the figure. Dade County, however, shows a decrease in reported green sea turtle nesting per kilometer. Except in 1980, the number of nests per kilometer in Dade County is low, which could be due to random fluctuations in nesting activity. Meylan *et al.* (1995) report that an increase in green sea turtle nesting has been observed statewide. We do not know the reason for this increase is unknown and regard it with cautious optimism.

Figure 1: Average number of loggerhead nests per kilometer surveyed in Florida from 1979 to 1992

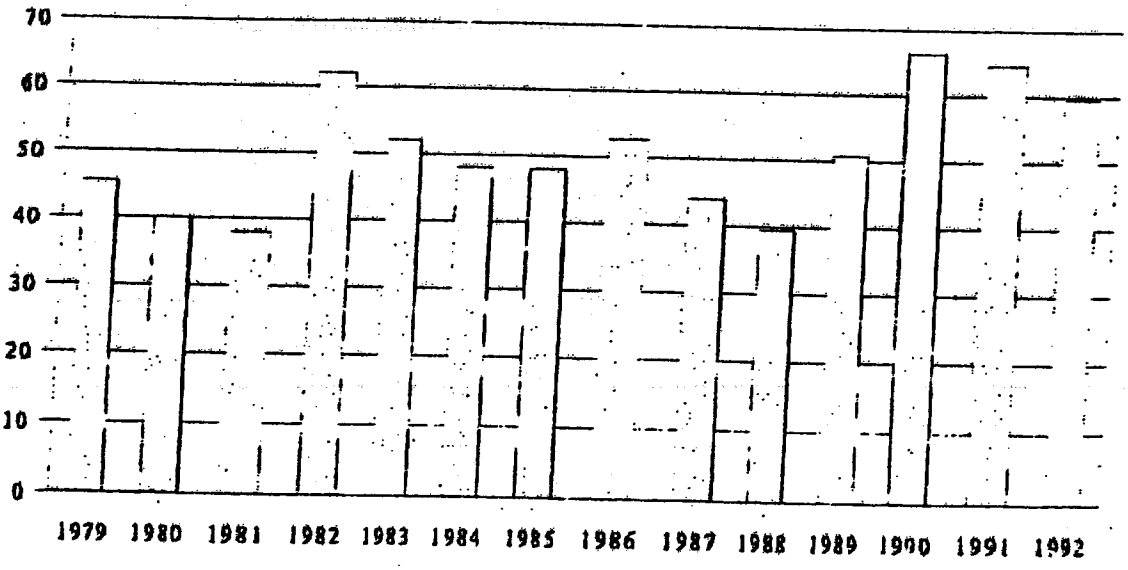


Figure 3. Green sea turtle nesting per kilometer surveyed for Dade, Broward and Palm Beach Counties, 1979 to 1994

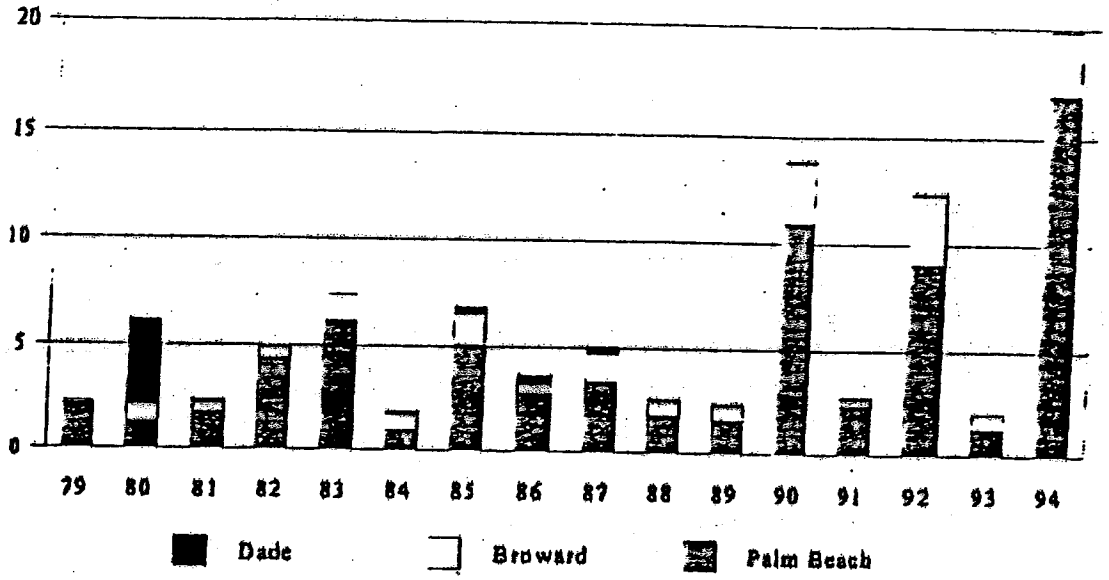
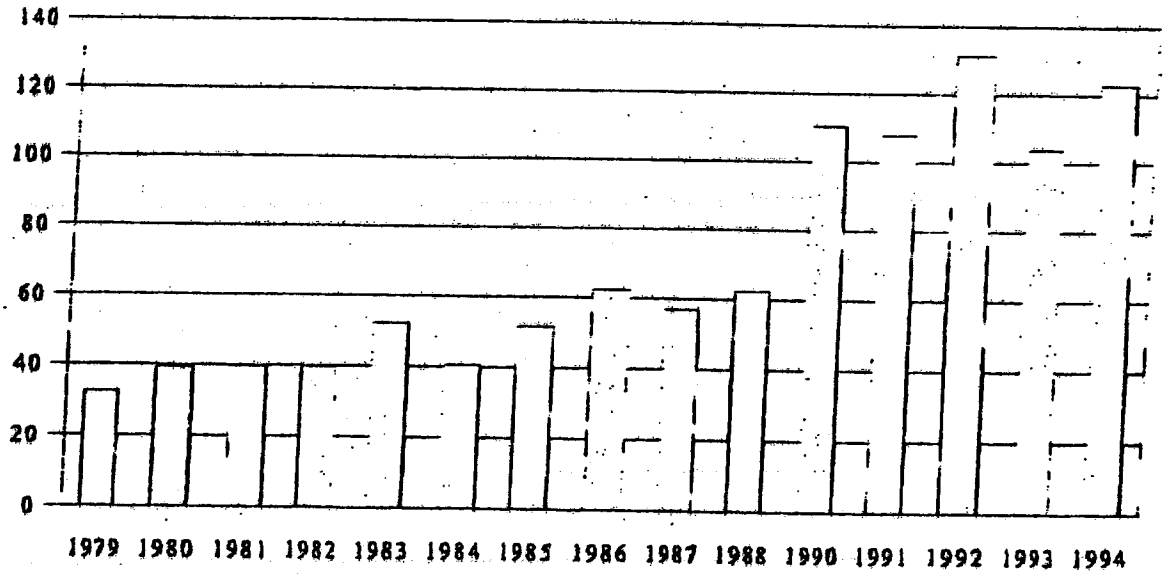


Figure 2. Average number of loggerhead nests per kilometer surveyed in Palm Beach, Broward, and Dade Counties, Florida, from 1979 to 1994



Leatherback nesting has fluctuated widely during the survey period between 1979 and 1994. In Palm Beach County, where the most leatherback nesting occurs, the reported nesting densities for the period vary from 0.3 nests per kilometer in 1980 to 2.3 nests per kilometer in 1994. A peak in nesting density occurred in 1983 when 1.8 nests per kilometer were reported. From 1979 to 1994, 735 leatherback nests were reported from Palm Beach County; Broward County reported 109 nests and Dade County reported 15 leatherback nests.

In Broward County, there is not a clear trend in leatherback nesting activity. Nests per kilometer ranged from 0.0 in 1990 to 0.7 in 1987. Nesting by leatherbacks in Dade County is too low to exhibit discernable trends.

No trends in nesting activity are evident in nesting frequency by the hawksbill sea turtle. As previously stated, however, seven hawksbill nests out of the 11 reported statewide from 1979 to 1994 were from Region III counties. Underreporting of hawksbill nests undoubtedly occurs as a result of their extended nesting season. Most seasonal beach surveys end in the late summer or early fall. Thus, hawksbill nests laid in late fall or early winter would not be included in the survey. Underreporting of leatherback nesting also occurs because leatherbacks begin nesting prior to the beginning of annual beach surveys. The nesting and hatching seasons for each species within Region III are given on the following page.

Species	Nesting and Hatching Dates
Loggerhead sea turtle	March 15 to November 30
Green sea turtle	May 1 to November 30
Leatherback sea turtle	February 15 to November 15
Hawksbill sea turtle	June 1 to December 31

D. Nest relocation

With few exceptions, most sea turtle nests are relocated from the beaches where they are laid in Broward and Dade Counties. This is done to protect the eggs and hatchlings from harm due to the high degree of human activity on these beaches. Most areas within these two counties are densely developed with multi-family residential (condominiums) and resort (hotels) development. The Atlantic shoreline at Golden Beach, Dade County and Hillsboro Beach, Broward County is developed with single-family residential development; public access and lighting are minimized. In these locations, nests are left *in situ*. Many of the Broward County nests are relocated to Hillsboro Beach. Nests are also left *in situ* at John U. Lloyd State Park, Broward County.

Both Broward and Dade Counties have been successful in hatching young loggerhead and green sea turtles from relocated nests. Broward County (1995) reports a 72.0 percent rate of hatching success for 1687 relocated nests. The 419 nests left *in situ* and monitored had a 76.6 percent hatching success rate. A significant fraction of the relocated nests (14) were laid by green turtles. Green turtle egg viability was greatly reduced by relocation. Only 55.6 percent of relocated green turtle eggs hatched while 76.1 percent of *in situ* green turtle eggs hatched successfully. Results in Dade County were similar. For the 326 relocated loggerhead nests, there was a 79.3 percent successful hatch rate. For the 29 *in situ* nests, the rate of successful hatching was 71.3 percent (Steve Blair, personal communication).

E. Nesting activity within each project area

All of the areas proposed for renourishment include some suitable nesting habitat. However, the proposed projects will not be constructed for many years and the suitability of each area for sea turtle nesting will likely change in this timeframe. Thus, the FWS will address the effect of individual projects on sea turtle nesting within each project area in later biological opinions.

EFFECTS OF THE PROPOSED ACTION

Since 1988, approximately 15 miles of shoreline have been renourished in Region III. These previously authorized projects have had a substantial effect on sea turtle nesting. The new proposed projects would

add to these effects by increasing incidental take due to nest relocation during construction, through missed nests, and through changes in the nesting environment after project construction. Conversely, nesting habitat within Region III will be increased over that which would exist without beach nourishment and renourishment.

A. Direct effects

Although beach nourishment may increase the potential nesting area, sea turles may be adversely affected if protective measures are not incorporated into project planning and implementation. Placement of sand on an eroded section of beach or an existing beach, in an of itself, is not likely to provide suitable nesting habitat for sea turtles.

Nourishment and sand transfer during the nesting season, particularly on or near high density nesting beaches, can cause increased loss of offspring from human-caused mortality and may significantly affect the long-term survival of the species. For instance, projects conducted during the nesting and hatching season could result in the loss of sea turtles through disruption of adult nesting activity and by burial or crushing of nests or hatchlings. While a nest monitoring and egg relocation program would reduce these effects, nests may be inadvertently missed or misidentified as false crawls during daily patrols. In addition, nests may be destroyed by operations at night prior to beach patrols being performed. Even under the best conditions, about seven percent of the nests can be missed by experienced turtle nest surveyors (Schroeder 1994).

1. Nest relocation

Besides the potential for missing nests during a relocation program, there is a potential for eggs to be damaged by their movement or for unknown biological mechanisms to be affected. Nest relocation can have adverse effects on incubation temperature (hence, sex ratios), gas exchange parameters, hydric environment of nests, hatching success, and hatchling emergence (Limpus *et al.* 1979, Ackerman 1980, Parmenter 1980, Spotila *et al.* 1983, McGehee 1990). Relocating nests into sand deficient in oxygen or moisture can result in mortality, morbidity, and reduced behavioral competence of hatchlings. Water availability is known to influence the incubation environment of the embryos and hatchlings of turtles with flexible-shelled eggs, which has been shown to affect nitrogen excretion (Packard *et al.* 1984), mobilization of calcium (Packard and Packard 1986), mobilization of yolk nutrients (Packard *et al.* 1985), hatchling size (Packard *et al.* 1981, McGehee 1990), energy reserves in the yolk at hatching (Packard *et al.* 1988), and locomotory ability of hatchlings (Miller *et al.* 1987).

FDEP has noted significant variations in comparing hatching success and emergence success between *in situ* and relocated nests (unpublished data). In a 1994 study, Meylan (unpulished data) found variations of hatching and emergence success of *in situ* and relocated nests at seven sites in Florida. Hatching success was lower for relocated nests in five of seven cases with an average decrease for all seven sites of 5.01 percent (16.31 percent decrease ↔ 7.19 percent increase). Emergence success was lower for relocated nests in all seven cases by an average of 11.67 percent (23.36 percent decrease ↔ 3.6 percent decrease).

A final concern with nest relocation is that it may concentrate eggs in an area resulting in a greater susceptibility to catastrophic events. Hatchlings released from concentrated areas may be subject to greater predation rates from both land and marine predators, who have adapted to concentrate their foraging efforts.

2. Equipment

The placement of pipelines and the use of heavy machinery on the beach during a construction project may also have adverse effects on sea turtles. They can create barriers to nesting females emerging from the surf and crawling up the beach, causing a higher incidence of false crawls and unnecessary energy expenditure.

3. Changes in the physical environment

Beach nourishment may result in changes in sand density (compaction), beach shear resistance (hardness), beach moisture content, beach slope, sand color, sand grain size, sand grain shape, and sand grain mineral content if the placed sand is dissimilar from the original beach sand (Nelson and Dickerson 1988a). These changes could result in adverse effects on nest site selection, digging behavior, clutch viability, and emergence by hatchlings (Nelson and Dickerson 1987, Nelson 1988).

4. Compaction

Beach compaction and unnatural beach profiles that may result from beach nourishment activities could adversely affect sea turtles regardless of the timing of the projects. Very fine sand and/or the use of heavy machinery can cause sand compaction on nourished beaches (Nelson *et al.* 1987, Nelson and Dickerson 1988a). Significant reductions in nesting success have been documented on severely compacted nourished beaches (Fletemeyer 1980, Raymond 1984, Nelson and Dickerson 1987, Nelson *et al.* 1987). Increased false crawls result in increased physiological stress to nesting females. Sand compaction may increase the length of time required for female sea turtles to excavate nests, again, causing increased physiological stress to the animals (Nelson and Dickerson 1988c). These effects can be minimized by using suitable sand and by tilling the beach after nourishment. Nelson and Dickerson (1988b) concluded that, in general, beaches nourished from offshore borrow sites are harder than natural beaches, and while some may soften over time through erosion and accretion of sand, others may remain hard for 10 years or more.

5. Escarpments

On nourished beaches, steep escarpments may develop along their water line interface as they adjust from an unnatural construction profile to a more natural beach profile (Coastal Engineering Research Center 1984, Nelson *et al.* 1987). These escarpments can hamper or prevent access to nesting sites. Female turtles coming ashore to nest can be discouraged by the formation of an escarpment, leading to situations where they choose marginal or unsuitable nesting areas to deposit eggs (e.g., in front of the escarpments which often results in failure of nests due to tidal inundation). This effect can be minimized by leveling the beach prior to the nesting season.

6. Sediment color

A change in sediment color on a beach could change the natural incubation temperatures of nests in an area which, in turn, could alter natural sex ratios. To provide the most suitable sediment for nesting sea turtles, the color of the nourished sediments must resemble the natural beach sand in the area. Natural reworking of sediments and bleaching from exposure to the sun would help to lighten dark nourishment sediments; however, the time frame for sediment mixing and bleaching to occur could be critical to a successful sea turtle nesting season.

7. Disorientation

Another effect to sea turtles is disorientation (loss of bearings) and misorientation (incorrect orientation) of hatchlings from artificial lighting. Visual cues are the primary sea-finding mechanism for hatchlings (Mrosovsky and Carr 1967, Mrosovsky and Shettleworth 1968, Dickerson and Nelson 1989, Witherington and Bjorndal 1991). Artificial beachfront lighting is a well documented cause of hatchling disorientation and misorientation on nesting beaches (Philbosian 1976, Mann 1977, FDEP unpublished data). In addition, research has also documented significant reduction in sea turtle nesting activity on beaches illuminated with artificial lights (Witherington 1992). Therefore, construction lights along a project beach and on the dredging vessel may deter females from coming ashore to nest, disorient females trying to return to the surf after a nesting event, and disorient and misorient emergent hatchlings from adjacent non-project beaches. Any source of bright lighting can profoundly affect the orientation of hatchlings, both during the crawl from the beach to the ocean and once they begin swimming offshore. Hatchlings attracted to light sources on dredging barges may not only suffer from interference in migration, but may also experience higher probabilities of predation to predatory fishes that are also attracted to the barge lights. This effect could be reduced by using the minimum amount of light necessary, require shielding or use low pressure sodium lighting during project construction.

B. Indirect effects

Future erosion of nesting beaches is a potential indirect effect of nourishment projects on sea turtles. Dredging sand offshore from a project area has the potential to cause erosion of the newly created beach or other areas on the same or adjacent beaches by creating a sand sink. The remainder of the beach system responds to this sand sink by providing sand from the beach in an attempt to reestablish equilibrium (National Research Council 1990b).

C. Cumulative effects

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Construction of all of the beach segments proposed in the Coast of Florida Study would have significant cumulative effects on sea turtle nesting in Region III. Approximately 60 miles of shoreline are proposed for construction out of a total of 93 miles. However, not all of the proposed project segments will be built at or near the same time. According to past construction schedules, four or five project segments could be constructed in a single year. As these constructed segments erode, other segments will be constructed. This cycle of erosion and renourishment will be repeated at various locations within the region resulting in little net gain of dry beach throughout the region. Some of the proposed projects may never be constructed. The net cumulative effect will be the additive incidental take of sea turtle nests and eggs due to relocation and burial of missed nests due to repetitive construction of beach projects. However, the annual rate of this incidental take, with precautions, should be low enough to remain within limits that are acceptable to the FWS.

CONCLUSION

After reviewing the current status of the loggerhead, green, leatherback and hawksbill sea turtles, the environmental baseline for the action area, the effects of the proposed beach nourishments, and the cumulative effects, it is the FWS' biological opinion that the planned actions in the Coast of Florida Study, Region III, as proposed, are not likely to jeopardize the continued existence of the sea turtles listed above.

No critical habitat has been designated for the loggerhead or green sea turtles. Critical habitat has been designated for leatherback sea turtles (St. Croix, U.S. Virgin Islands) and for hawksbill sea turtles (Mona, Culebrita, and Culebra Islands, Puerto Rico). These proposed actions do not affect those areas, thus, there is no effect on designated critical habitat for these two species.

INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of the ESA, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The COE has a continuing duty to regulate the activity covered by this incidental take statement. If the COE (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or extent of incidental take

Broward County and Palm Beach County (excluding sand transfer plants)

The FWS has reviewed the biological information and other information relevant to this action. Based on this review, incidental take is anticipated for all sea turtle nests that may be constructed and eggs that may be deposited from March 1 through April 30 and from September 1 through September 30 and missed by a nest survey and egg relocation program within the boundaries of the seventeen proposed fill projects. Incidental take is also anticipated for all sea turtle nests deposited from October 1 through February 28 (or 29 as applicable) when a nest survey and egg relocation program is not required to be in place within the boundaries of the proposed project. Without the prescribed precautions, this take could equal 253 missed nests and 27,000 eggs rendered inviable through relocation annually.

Dade County and Palm Beach County sand transfer plants

The FWS has reviewed the biological information and other information relevant to this action. Based on this review, incidental take is anticipated for all sea turtle nests that may be constructed and eggs that may be deposited and missed by a nest survey and egg relocation program within the boundaries of the proposed projects. Incidental take is also anticipated for all sea turtle nests deposited during the period when a nest survey and egg relocation program is not required to be in place within the boundaries of the proposed project.

Effect of the take

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and prudent measures

Broward County and Palm Beach County (excluding sand transfer plants)

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of loggerhead, green, leatherback and hawksbill sea turtles in Broward and Palm Beach Counties.

1. Only beach quality sand suitable for sea turtle nesting, successful incubation, and hatchling emergence shall be used on the project site.

2. Beach nourishment activities shall not occur from May 1 through October 31, the period of peak sea turtle egg laying and egg hatching, to reduce the possibility of sea turtle nest burial or crushing of eggs.

3. If the beach nourishment project will be conducted during the period from March 1 through April 30, surveys for early nesting sea turtles shall be conducted. If these surveys find nests in a beach nourishment area, the eggs of those nests shall be relocated.

4. If the beach nourishment project will be conducted during the period from November 1 through November 30, surveys for late nesting sea turtles shall be conducted. If these surveys find nests in a beach nourishment area, the eggs of those nests shall be relocated.

5. Immediately after completing a beach nourishment project and prior to the next three nesting seasons, beach compaction shall be monitored and tilling shall be conducted by March 1, as required, to reduce the likelihood of affecting sea turtle nesting and hatching activities. The March 1 deadline is required to reduce adverse effects to leatherbacks that nest in greater frequency along the South Atlantic coast of Florida than elsewhere in the contiguous United States.

6. Immediately after completion of the beach nourishment project and prior to the next three nesting seasons, monitoring shall be conducted to determine if escarpments are present and escarpments shall be leveled as required to reduce the likelihood of affecting sea turtle nesting and hatching activities.

7. The COE shall ensure that contractors doing the beach nourishment work fully understand the sea turtle protection measures detailed in this incidental take statement.

8. During the early and late portions of the nesting season, construction equipment and pipes shall be stored in a manner that will minimize effects to sea turtles to the maximum extent practicable.

9. During the early and late portions of the nesting season, lighting associated with the project shall be minimized to reduce the possibility of disrupting and disorienting nesting and/or hatchling sea turtles.

Dade County and all sand transfer plants

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of loggerhead, green, leatherback, and hawksbill sea turtles in Dade County and at the site of all sand transfers.

1. Only beach-quality sand suitable for sea turtle nesting, successful incubation, and hatchling emergence shall be used on the project site.

2. If a beach nourishment project or sand transfer will be conducted during the sea turtle nesting season, surveys for nesting sea turtles shall be conducted. If these surveys find nests in the beach nourishment or sand transfer areas, including the area from which sand will be transferred, the eggs of those nests shall be relocated.

3. Immediately after completion of a nourishment or transfer of sand and prior to the next three nesting seasons, beach compaction shall be monitored and tilling shall be conducted, as required, to reduce the likelihood of affecting sea turtle nesting and hatching activities.

4. Immediately after completion of the beach nourishment or transfer of sand and prior to the next three nesting seasons, monitoring shall be conducted to determine if escarpments are present and escarpments shall be leveled as required to reduce the likelihood of affecting sea turtle nesting and hatching activities.

5. The COE shall ensure that contractors doing the beach nourishment or transfer work fully understand the sea turtle protection measures detailed in this incidental take statement.

6. During the sea turtle nesting season, construction equipment and pipes shall be stored in a manner that will minimize effects to sea turtles to the maximum extent practicable.

7. During the sea turtle nesting season, lighting associated with the project shall be minimized to reduce the possibility of disrupting and disorienting nesting and/or hatchling sea turtles.

Terms and conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the COE must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

Broward County and Palm Beach County (excluding sand transfer plants)

1. Fill material placed on the beach shall be sand that is similar to that already existing at the beach site in both coloration and grain size. All such fill material shall be free of construction debris, rocks, or other foreign matter and shall not contain, on average, greater than 10 percent fines (i.e., silt and clay) passing a No. 200 sieve and shall not contain, on average, greater than 5 percent coarse gravel or cobbles, exclusive of shell material retained by a No. 4 sieve.

2. Beach nourishment shall be started after October 31 and be completed before May 1. During the May 1 through October 31 period, no construction equipment or pipes shall be stored on the beach.

3. If the beach nourishment project will be conducted during the period from March 1 through April 30, daily early morning surveys for sea turtle nests shall be conducted within the period from March 1 through April 30 that the project is being conducted, and eggs shall be relocated per the following requirements.

   a. Nest surveys and egg relocations shall only be conducted by personnel with prior experience and training in nest survey and egg relocation procedures. Surveyors shall have a valid FDEP permit. Nest surveys shall be conducted daily between sunrise and 9 a.m. Surveys shall be performed in such a manner that ensures that construction activity does not occur in any location prior to completion of the necessary sea turtle protection measures.

   b. Only those nests that may be affected by construction activities shall be relocated. Nests requiring relocation shall be moved no later than 9 a.m. the morning following deposition to a nearby self-release beach site in a secure setting where artificial lighting will not interfere with hatchling orientation. Nest relocations in association with construction activities shall cease when construction activities no longer threaten nests. Nests deposited within areas where construction activities have ceased or will not occur for 65 days shall be marked and left in place unless other factors threaten the success of the nest. Any nests left in the active construction zone shall be clearly marked, and all mechanical equipment shall avoid nests by at least 10 feet.

4. If the beach nourishment project will be conducted during the period from November 1 through November 30, daily early morning surveys for sea turtle nests shall be conducted 65 days prior to project initiation and continue through September 30, and eggs shall be relocated in accordance with the requirements outlined above.

5. Immediately after completion of the beach nourishment project and prior to March 1 for three subsequent years, sand compaction shall be monitored in the area of restoration in accordance with protocol agreed to by the FWS, the FDEP, and the applicant. At a minimum, the protocol provided under 5a and 5b (below) shall be followed. If required, the area shall be tilled to a depth of 36 inches. All tilling activity must be completed prior to March 1. A report on the results of compaction monitoring shall be submitted to the FWS prior to any tilling actions being taken. An annual summary of compaction surveys and the actions taken shall be submitted to the FWS. This condition shall be evaluated annually and may be modified, if necessary, to address sand compaction problems identified during the previous year.

   a. Compaction sampling stations shall be located at 500-foot intervals along the project area. One station shall be at the seaward edge of the dune/bulkhead line (when material is placed

in this area); one station shall be midway between the dune line and the high water line (normal wrack line); and one station shall be located just landward of the high water line. At each station, the cone penetrometer shall be pushed to a depth of 6, 12, and 18 inches three times (three replicates). Material may be removed from the hole if necessary to ensure accurate readings of successive levels of sediment. The penetrometer may need to be reset between pushes, especially if sediment layering exists. Layers of highly compact material may lay over less compact layers. Replicates shall be located as close to each other as possible, without interacting with the previous hole and/or disturbed sediments. The three replicate compaction values for each depth shall be averaged to produce final values for each depth at each station. Reports shall include all 27 values for each transect line, and the final nine averaged compaction values.

b. If the average value for any depth exceeds 500 poundes per square inch (psi) for any two or more adjacent stations, then that area shall be tilled prior to March 1. If values exceeding 500 psi are distributed throughout the project area but in no case do those values exist at two adjacent stations at the same depth, then consultation with the FWS shall be required to determine if tilling is required. If a few values exceeding 500 psi are present randomly within the project area, tilling shall not be required.

6. Visual surveys for escarpments along the project area shall be made immediately after completion of the beach nourishment project and prior to March 1 for three subsequent years. Results of the surveys shall be submitted to the FWS prior to any action being taken. Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet shall be leveled to the natural beach contour by March 1. The FWS shall be contacted immediately if subsequent reformation of escarpments that can interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet occurs during the nesting and hatching season to determine the appropriate action to be taken. If it is determined that escarpment leveling is required during the nesting or hatching season, the FWS will provide a brief written authorization that describes methods to be used to reduce the likelihood of affecting existing nests. An annual summary of escarpment surveys and actions taken shall be submitted to the FWS.

7. The COE shall arrange a meeting between representatives of the contractor, the FWS, the FDEP, and the permitted person responsible for egg relocation at least 30 days prior to the commencement of work on this project. At least 10 days advance notice shall be provided prior to conducting this meeting. This will provide an opportunity for explanation and/or clarification of the sea turtle protection measures.

8. From March 1 through April 30 and November 1 through November 30, staging areas for construction equipment shall be located off the beach to the maximum extent practicable. Nighttime storage of construction equipment not in use shall be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, all construction pipes that are placed on the beach shall be located as far landward as possible without compromising the integrity of the existing or reconstructed dune system. Temporary storage of pipes shall be off the beach to the maximum extent possible. Temporary storage of pipes on the beach shall be in such a manner so as to affect the least amount of nesting habitat and shall likewise not compromise the integrity of the dune systems (placement of pipes perpendicular to the shoreline is recommended as the method of storage).

9. From March 1 through April 30 and November 1 through November 30, all on-beach lighting associated with the project shall be limited to the immediate area of active construction only. Such lighting shall be shielded low pressure sodium vapor lights to minimize illumination of the nesting beach and nearshore waters. Red filters should be placed over vehicle headlights (i.e., bulldozers, front-end loaders). Lighting on offshore equipment shall be similarly minimized through reduction, shielding, lowering, and appropriate placement of lights to avoid excessive illumination of the water, while meeting all U.S. Coast Guard and OSHA requirements. Shielded low pressure sodium vapor lights are highly recommended for lights on offshore equipment that cannot be eliminated.

10. A report describing the actions taken to implement the terms and conditions of this incidental take statement shall be submitted to the South Florida Ecosystem Office within 60 days of completion of the proposed work for each year when activity has occurred. Each report shall include the dates of actual construction activities, names and qualifications of personnel involved in nest surveys and relocation activities, descriptions and locations of hatcheries, nest survey and relocation results, and hatching success of nests.

11. In the event a sea turtle nest is excavated during construction activities, the permitted person responsible for egg relocation for the project should be notified so the eggs can be moved to a suitable relocation site.

12. Upon locating a dead, injured, or sick threatened or endangered sea turtle specimen, initial notification must be made to the FWS' Law Enforcement Office in Miami, Florida, at (305) 526-2789. Care should be taken in handling sick or injured specimens to ensure effective treatment and care and in handling dead specimens to preserve biological materials in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered or threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

Dade County and all sand transfer plants

1. Material placed on the beaches shall be sand that is similar to that already existing at the beach site in both coloration and grain size. All such fill material shall be free of construction debris, rocks, or other foreign matter and shall generally not contain, on average, greater than 10 percent fines (i.e., silt and clay) passing a No. 200 sieve and shall not contain, on average, greater than 5 percent coarse gravel or cobbles, exclusive of shell material retained by a No. 4 sieve.

2. Daily early morning surveys shall be required if any portion of the beach nourishment project occurs during the period from April 1 to November 30. Nesting surveys shall be initiated 65 days prior to nourishment activities or by April 1, whichever is later. Nesting surveys shall continue through the end of the project or through September 30, whichever is earlier. If these surveys find nests in areas where they may be affected by construction activities, the eggs of those nests shall be relocated per the following requirements:

   a. Nest surveys and egg relocations shall only be conducted by personnel with prior experience and training in nest survey and egg relocation procedures. Surveyors shall have a valid FDEP permit. Nest surveys shall be conducted daily between sunrise and 9 a.m. Surveys shall be performed in such a manner so as to ensure that construction activity does not occur in any location prior to completion of the necessary sea turtle protection measures.

b. Only those nests that may be affected by construction or sand transfer activities shall be relocated. Nests requiring relocation shall be moved no later than 9 a.m. the morning following deposition to a nearby self-release beach site in a secure setting where artificial lighting will not interfere with hatchling orientation. Nest relocations in association with construction activities shall cease when construction activities no longer threaten nests. Nests deposited within areas where construction activities have ceased or will not occur for 65 days shall be marked and left in place unless other factors threaten the success of the nest. Any nests left in the active construction zone shall be clearly marked, and all mechanical equipment shall avoid nests by at least 10 feet.

3. Immediately after completion of the beach nourishment project or sand transfer and prior to April 1 for three subsequent years, sand compaction shall be monitored in the area of restoration in accordance with a protocol agreed to by the FWS, the FDEP, and the applicant. At a minimum, the protocol provided under 3a and 3b below shall be followed. If required, the area shall be tilled to a depth of 36 inches. All tilling activity must be completed prior to April 1. If the project is completed during the nesting season, tilling shall not be performed in areas where nests have been left in place or relocated. A report on the results of compaction monitoring shall be submitted to the FWS prior to any tilling actions being taken. An annual summary of compaction surveys and the actions taken shall be submitted to the FWS. This condition shall be evaluated annually and may be modified if necessary to address sand compaction problems identified during the previous year.

   a. Compaction sampling stations shall be located at 500-foot intervals along the project area. One station shall be at the seaward edge of the dune/bulkhead line (when material is placed in this area); one station shall be midway between the dune line and the high water line (normal wrack line); and one station shall be located just landward of the high water line. At each station, the cone penetrometer shall be pushed to a depth of 6, 12, and 18 inches three times (three replicates). Material may be removed from the hole if necessary to ensure accurate readings of successive levels of sediment. The penetrometer may need to be reset between pushes, especially if sediment layering exists. Layers of highly compact material may lay over less compact layers. Replicates shall be located as close to each other as possible, without interacting with the previous hole and/or disturbed sediments. The three replicate compaction values for each depth shall be averaged to produce final values for each depth at each station. Reports shall include all 27 values for each transect line, and the final nine averaged compaction values.

   b. If the average value for any depth exceeds 500 psi for any two or more adjacent stations, then that area shall be tilled immediately prior to April 1. If values exceeding 500 psi are distributed throughout the project area but in no case do those values exist at two adjacent stations at the same depth, then consultation with the Fish and Wildlife Service shall be required to determine if tilling is required. If a few values exceeding 500 psi are present randomly within the project area, tilling shall not be required.

4. Visual surveys for escarpments along the project area shall be made immediately after completion of the beach nourishment project and prior to April 1, for three subsequent years. Results of the surveys shall be submitted to the FWS prior to any action being taken. Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet shall be leveled to the natural beach contour by April 1. If the project is completed during the sea turtle nesting and hatching season, escarpments may be required to be leveled immediately, while protecting

nests that have been relocated or left in place. The FWS shall be contacted immediately if subsequent reformation of escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet occurs during the nesting and hatching season to determine the appropriate action to be taken. If it is determined that escarpment leveling is required during the nesting or hatching season, the FWS will provide a brief written authorization that describes methods to be used to reduce the likelihood of affecting existing nests. An annual summary of escarpment surveys and actions taken shall be submitted to the FWS.

5. The COE shall arrange a meeting between representatives of the contractor, the FWS, the FDEP and the permitted person responsible for egg relocation at least 30 days prior to the commencement of work on this project. At least 10 days advance notice shall be provided prior to conducting this meeting. This will provide an opportunity for explanation and/or clarification of the sea turtle protection measures.

6. From April 1 to November 10, staging areas for construction equipment shall be located off the beach to the maximum extent practicable. Nighttime storage of construction equipment not in use shall be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, all construction pipes that are placed on the beach shall be located as far landward as possible without compromising the integrity of the existing or reconstructed dune system. Temporary storage of pipes shall be off the beach to the maximum extent possible. Temporary storage of pipes on the beach shall be in such a manner so as to affect the least amount of nesting habitat and shall likewise not compromise the integrity of the dune systems (placement of pipes perpendicular to the shoreline is recommended as the method of storage).

7. From April 1 to November 30, all on-beach lighting associated with the project shall be limited to the immediate area of active construction only. Such lighting shall be shielded low pressure sodium vapor lights to minimize illumination of the nesting beach and nearshore waters. Red filters should be placed over vehicle headlights (i.e., bulldozers, front-end loaders). Lighting on offshore equipment shall be similarly minimized through reduction, shielding, lowering, and appropriate placement of lights to avoid excessive illumination of the water, while meeting all U.S. Coast Guard and OSHA requirements. Shielded low pressure sodium vapor lights are highly recommended for lights on offshore equipment that cannot be eliminated.

8. A report describing the actions taken to implement the terms and conditions of this incidental take statement shall be submitted to the South Florida Ecosystem Office within 60 days of completion of the proposed work for each year when activity has occurred. Each report will include the dates of actual construction activities, names and qualifications of personnel involved in nest surveys and relocation activities, descriptions and locations of hatcheries, nest survey and relocation results, and hatching success of nests.

9. In the event a sea turtle nest is excavated during construction activities, the permitted person responsible for egg relocation for the project should be notified so the eggs can be moved to a suitable relocation site.

10. Upon locating a dead, injured, or sick threatened or endangered sea turtle specimen, initial notification must be made to the FWS' Law Enforcement Office in Miami, Florida, at (305) 526-2789. Care should be taken in handling sick or injured specimens to ensure effective treatment and care and in handling dead specimens to preserve biological materials in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered or

threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. With implementation of these measures, the FWS believes that no more than those sea turtle nests and eggs that may be missed by a nest survey and egg relocation program, or those laid during the period when an egg relocation program is not required, will be incidentally taken. The FWS estimates this annual take to be three nests which may be missed by surveyors and 270 eggs rendered inviable by relocation. If, during the course of the action, this minimized level of incidental take is exceeded, such incidental take represents new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

Palm Beach County and Broward County

1. Appropriate native salt-resistant dune vegetation should be established on the restored dunes. The FDEP's Bureau of Beaches and Coastal Systems can provide technical assistance on the specifications for design and implementation.

2. Surveys for nesting success of sea turtles should be continued for a minimum of three years following beach nourishment to determine whether sea turtle nesting success has been adversely affected.

3. Educational signs should be placed where appropriate at beach access points explaining the importance of the area to sea turtles and/or the life history of sea turtle species that nest in the area.

Dade County

1. Construction activities for this project and similar future projects should be planned to take place outside the main part of the sea turtle nesting and hatching season.

2. Appropriate native salt-resistant dune vegetation should be established on the restored dunes. The FDEP's Bureau of Beaches and Coastal Systems can provide technical assistance on the specifications for design and implementation.

3. Surveys for nesting success of sea turtles should be continued for a minimum of three years following beach nourishment to determine whether sea turtle nesting success has been adversely affected.

4. Educational signs should be placed where appropriate at beach access points explaining the importance of the area to sea turtles and/or the life history of sea turtle species that nest in the area.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

REINITIATION

This concludes formal consultation on the action(s) outlined in the initiation request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Thank you for your cooperation in the effort to protect threatened and endangered sea turtles and their nesting habitat. If you any questions regarding this biological opinion, please do not hesitate to contact Chuck Sultzman of our office at (561) 562-3909.

Sincerely,

for

Craig Johnson
Supervisor, South Florida Ecosystem Office

cc:
FWS, Jacksonville, FL (Attn: Sandy MacPherson)
FDEP (OPSM), Tallahassee, FL
NMFS, St. Petersburg, FL

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

March 1, 2001

James C. Duck
Chief, Planning Division
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Service Log No.: 4-1-01-F-400
Project.: Alternate Test Beach Renourishment
Dated: July 13, 1999
Local Sponsor: Miami-Dade County
County: Miami-Dade

Dear Mr. Duck:

This letter serves to amend the October 24, 1996, Biological Opinion (BO) for the Coast of Florida Study, Region III as it pertains to the project referenced above. This letter is provided in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

This project has the potential to affect four species of sea turtles. Florida's beaches function as nesting habitat for the federally endangered green (*Chelonia mydas*), endangered leatherback (*Dermochelys coriacea*), endangered hawksbill (*Eretmochelys imbricata*),and threatened loggerhead (*Caretta caretta*) sea turtles. These species are known to nest within the project limits.

The Corps agreed that since project limits fall within the boundaries identified in the Coast of Florida Study, the programmatic BO is applicable. Several revisions to this BO have been completed since 1996 which incorporate new Service guidance on section 7 consultations for sea turtles. The Corps and local sponsor will implement this proposed project consistent with the Coast of Florida Study Biological Opinion, as revised.

The Coast of Florida Study Biological Opinion, and the following four revised sections are relevant to this proposed project:

Lighting (Terms and Conditions; Number 9)

From March 1 through April 30 and November 1 through November 30, all on-beach lighting associated with the project shall be limited to the immediate area of active construction only and shall be the minimal lighting necessary to comply with safety requirements. Shielded low pressure sodium vapor lights are recommended to minimize illumination of the nesting beach and nearshore waters. Lighting on offshore equipment shall be minimized through reduction, shielding, lowering, and appropriate placement of lights to avoid excessive illumination of the water, while meeting all U.S. Coast Guard and OSHA requirements. Shielded low pressure sodium vapor lights are highly recommended for lights on offshore equipment that cannot be eliminated.

Incidental Take Statement

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered or threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by the Corps so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impacts on the species to the Service as specified in the incidental take statement [50 CFR §402.14(I)(3)].

Amount or Extent of Incidental Take

The Service has reviewed the biological information and other information relevant to this action. Based on this review, incidental take is anticipated for (1) all sea turtle nests that may be constructed and eggs that may be deposited from March 1 through April 30 and from September 1 through September 30 and missed by a nest survey and egg relocation program within the boundaries of the proposed project; (2) all sea turtle nests deposited from October 1 through February 28 (or 29 as applicable) when a nest survey and egg relocation program is not required to be in place within the boundaries of the proposed project; (3) harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches as a result of construction activities; (4) disorientation of hatchling turtles on beaches adjacent to the construction area as they emerge from the nest and crawl to the water as a result of project lighting; (5) behavior modification of nesting females due to escarpment formation within the project area during a nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; (6) all nests destroyed as a result of escarpment leveling within a nesting season when such leveling has been approved by the Fish and Wildlife Service; and (7) reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site.

Incidental take is anticipated for only the 1.5 miles of beach that have been identified for sand placement. The Service anticipates incidental take of sea turtles will be difficult to detect for the following reasons: (1) the turtles nest primarily at night and all nests are not found because [a] natural factors, such as rainfall, wind, and tides may obscure crawls and [b] human-caused factors, such as pedestrian and vehicular traffic, may obscure crawls, and result in nests being destroyed because they were missed during a nesting survey and egg relocation program; (2) the total number of hatchlings per undiscovered nest is unknown; (3) the reduction in percent hatching and emerging success per relocated nest over the natural nest site is unknown; (4) an unknown number of females may avoid the project beach and be forced to nest in a less than optimal area; (5) lights may disorient an unknown number of hatchlings and cause death; and (6) escarpments may form and cause an unknown number of females from accessing a suitable nesting site. However, the level of take of these species can be anticipated by the disturbance and renourishment of suitable turtle nesting beach habitat because: (1) turtles nest within the project site; (2) beach renourishment will likely occur during a portion of the nesting season; (3) the renourishment project will modify the incubation substrate, beach slope, and sand compaction; and (4) artificial lighting will disorient nesting females and hatchlings.

Terms and Conditions Summation Paragraph

> The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The amount or extent of incidental take for sea turtles will be considered exceeded if the project results in more than a one-time placement of sand on the 1.5 miles of beach proposed for nourishment. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

Consultation under section 7 of the ESA should continue as upland sand specifications, sand source alternatives, and sand transport details are evaluated. It may be necessary to initiate consultation for additional species, depending on development of these plans.

Thank you for your cooperation in the effort to protect threatened and endangered sea turtles and their nesting habitat. We are available to meet with agency representatives and the applicant to resolve outstanding resource issues associated with this project. If you have any questions, please contact Trish Adams at (561) 562-3909 extension 232.

Sincerely yours,

James J. Slack
Field Supervisor
South Florida Ecological Services Office

cc:
Service, Jacksonville, Florida (Sandy MacPherson)

JUL 20 2000

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, Florida 33702

July 14, 2000

James Slack
U.S. Department of the Interior
Fish and Wildlife Service
South Florida Ecosystem Office
P.O. Box 2676
Vero Beach, Florida 32961-2676

Dear Mr. Slack:

The National Marine Fisheries Service (NMFS) has reviewed the draft Fish and Wildlife Coordination Act Report (CAR) dated June 20, 2000, on the Dade County Beach Erosion Control and Hurricane Protection Project. The proposed project involves placing sand fill along approximately 1.5 miles of shoreline near 63rd Street in Miami Beach, Dade County, Florida.

The draft CAR indicates the proposed project will extend over approximately 1.5 miles of shoreline, located between DEP monuments R-36 and R-47, and involves 600,000 cubic yards of fill material. According to the document, the ocean bottom along the length of the proposed project is composed of barren sand. Reef maps from the Corps of Engineers' 1996 Coast of Florida Erosion and Storm Effects Study, Region III (Coast of Florida Study) indicates that the nearest hard bottom reefs are located approximately 1/4 mile offshore. The draft CAR also indicates that the original scope of work called for using non-domestic sand material, but that this was changed to an unidentified domestic upland source at the request of the U.S. Fish and Wildlife Service (FWS). Therefore, the FWS has made the determination that because the project does not involve dredging of offshore areas, the effects on fish and wildlife resources along the project area should be insignificant.

The NMFS agrees that impacts to marine resources normally associated with dredging within borrow areas will be eliminated with this project. However, the NMFS recommends that a benthic survey of the nearshore area near the beach fill should be conducted to insure that no hard bottom habitat will be affected. The benthic maps used in the Coast of Florida Study are over 4-years old and may not reflect the current hard bottom reef locations and topographies. In addition, we agree with the FWS' recommendation that the sand specification information, along with soil chemical analysis, should be provided for review. The NMFS has some concerns that should the sand material be inconsistent with beach quality standards, siltation and turbidity plumes may impact nearshore hard bottom habitat. These areas are Essential Fish Habitat (EFH), as defined by 1996 amendment to the Magnuson-Stevens Fishery Conservation and Management Act and could be adversely affected by the proposed project. The South Atlantic Fishery Management Council (SAFMC) has identified EFH in the project area for species they manage including shrimp, the snapper-grouper complex (containing ten families and 73 species), Spanish and king mackerel, coral, and coral reef communities, and spiny lobster. The NMFS has identified EFH for highly migratory species that include billfishes and species of sharks that inhabit this area, such as nurse, blacktip, sandbar, lemon, and bull sharks. Likewise, the Mid Atlantic Fishery Management Council has identified EFH for bluefish that includes pelagic waters in the project area from the coastline to well beyond the construction limits for this project. Various life stages of some managed species found in the project area include larvae, postlarvae, juvenile and adult stages of red, gray, lane, schoolmaster, mutton and yellowtail snappers, scamp, speckled hind, red, yellowedge and gag groupers, Spanish and king mackerel, bluefish, white grunt, and spiny lobster.

Categories of EFH that may occur within the project area include marine water column (including pelagic waters), live/hard bottoms, coral, coral reefs, and artificial/manmade reefs. The SAFMC also has identified EFH Habitat Areas of Particular Concern (HAPC) within the project area. HAPCs are subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. Offshore areas of high habitat value or vertical relief and habitats used for migration, spawning, and rearing of fish and shellfish have been included within HAPC. Specifically, categories of HAPC in the vicinity of the proposed project include hermatypic coral habitat and reefs and hard bottom habitats.

In addition to EFH for Federally managed species, hard bottom, coral, and shallow nearshore habitats provide nursery, foraging, and refuge habitat for other commercially and recreationally important fish and shellfish. Species such as blue crab, shrimp, flounder, red drum, pompano, snook, striped mullet, tarpon, and a variety reef fish and tropical fish are among the many species that utilize this habitat.

The nearshore hard bottom reefs serve as settlement habitats for immigrating larvae of fish and invertebrates or as intermediate nursery habitats for juveniles emigrating out of nearby inlets (Vare 1991; Lindeman and Snyder 1999). At least eighty-six taxa of fish have been quantified among nearshore hard bottom habitats along southeast mainland Florida; including at least 34 species of juvenile reef fish which may utilize these habitats as nursery areas (Lindeman and Snyder 1999). Gilmore and Herrema (1981) recorded 107 species of fish from the littoral and sublittoral surf zone reef of central-east Florida. Peters (1984) found that in samples taken from the surf zones near Sebastian Inlet, a significantly higher abundance and diversity of fish were found adjacent to nearshore hard bottom habitats.

In addition, green, hawksbill, leatherback, and loggerhead sea turtles are all known to utilize Dade County beach and nearshore habitats for nesting, foraging, and resting, and are protected by the NMFS and U.S. Fish and Wildlife Service under the Endangered Species Act of 1973. Environmental assessments completed for past beach renourishment projects have limited their discussion of sea turtles to the impacts on nesting habitat (USACE 1987, 1994, & 1996). However, several studies have determined that nearshore hard bottom habitats are important nursery area for juvenile green turtles and loggerheads (Wershoven 1987; Wershoven and Wershoven 1989; Guseman and Ehrhart 1990; Wershoven 1992). Because this proposed project may impact endangered sea turtles, copies of the final CAR should be forwarded to our Protected Resources Division at the letterhead address above.

We appreciate the opportunity to provide these comments. If we can be of further assistance, please advise. Related comments, questions or correspondence should be directed to Mr. Michael R. Johnson in Miami, Florida, at 305-595-8352.

Sincerely,

W. Hawk Thompson, Jr.

Andreas Mager, Jr.
Assistant Regional Administrator
Habitat Conservation Division

cc:
F/SER4
F/SER3
F/SER43-Johnson

Literature Cited

Gilmore, R.G. and D.J. Herrema. 1981. Fishes of the Indian River Lagoon and adjacent waters, Florida. Harbor Branch Foundation, Inc. Tech. Rep. 41. 64 pp.

Guseman, J.L. and L.M. Ehrhart. 1990. Green turtles on sabellariid worm reefs: initial results from studies on the Florida Atlantic coast. *In* Proc. 10th Annual Workshop on Sea Turtle Biology and Conservation. NOAA Tech. Mem. NMFS-SEFC-278. p. 125-127.

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FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

Appendix 4

JAMES L. "JAMIE" ADAMS, JR. Bushnell
BARBARA C. BARSH Jacksonville
QUINTON L. HEDGEPETH, DDS Miami
H.A. "HERKY" HUFFMAN Deltona
DAVID K. MEEHAN St. Petersburg
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EDWIN P. ROBERTS, DC Pensacola
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OFFICE OF ENVIRONMENTAL SERVICES
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May 30, 2000

Mr. James J. Slack
Project Leader
South Florida Field Office
U.S. Fish and Wildlife Service
P.O. Box 2676
Vero Beach, Florida 32961-2676

Re: Dade County Beach Erosion Control and Hurricane Protection Project, Dade County

Dear Mr. Slack:

The Office of Environmental Services of the Florida Fish and Wildlife Conservation Commission has reviewed the referenced report. We concur with the U.S. Fish and Wildlife Service's conclusions and recommendations regarding this project.

Sincerely,

Stephen R. Lau
Biological Administrator

ENV 1-4-2

SRL/js

BEACH FILL

1. PAYMENT

Payment for sand fill shall be made on the basis of the quantity of sand placed within each Acceptance Section, as measured by the volume of sand within the template shown on the plans. The total quantity may be modified depending on the Mean Grain Size of the sand delivered, according to these specifications and the Bid Schedule. During placement and prior to measurement, the fill sand must have been flooded to consolidate the sand, according to these specifications. Acceptance Sections will not be accepted by the Government until all Mean Grain Size analysis and calculations has been completed for that Acceptance Section, verifying the Mean Grain Size of sand delivered, and thus the proper quantity of sand for that Mean Grain Size, as shown on the Bid Schedule.

2. ACCEPTANCE SECTIONS

Acceptance Sections shall be every 500 feet along the project beach.

3. SAND SOURCE

This project is a test fill for a generic upland source of sand. No offshore sand sources shall be an acceptable source.

4. SAND FILL MATERIAL

The Contractor is responsible for providing a source, delivery and spreading of beach compatible sand that meet the following specifications. The sand supplied shall be naturally created. The sand may be processed, but manufactured sand is not allowed. Contractor's offering blended sand shall submit a Blending Plan, showing the method the sand components will be thoroughly mixed before final placement on the beach. The project requires the contractor to Bid sand with an average mean grain size of 0.30 mm or greater. The sand will be placed and shaped on the beach to fill the construction template shown in the plans, except as modified by the Mean Grain Size. Final beach fill shape shall parallel the construction template shown in the plans.

The project will benefit from placement of coarser sand, and incentive is provided to bid the coarsest sand available. The incentive is in two parts:

1) The project design beach must be built to the template shown on the plans. A price incentive for an increased Average Mean Grain Size is offered for that portion of the fill quantity (52 percent of the total quantity).
2) For the advance nourishment portion of the project fill (48 percent of the total quantity), a reduced quantity incentive for an increased Average Mean Grain Size is offered.

If the contractor can provide sand with an Average Mean Grain Size of 0.33mm or coarser, the corresponding Bid and placed quantity will be reduced. Placed volume reduction for coarser sand is available on the Bid Schedule, up to a maximum allowable Mean Grain Size of 0.55 mm. The contractor should select the largest (coarsest) Mean Grain Size he can provide. **The contractor is warned that failure to achieve the grain size class selected on the Bid Schedule, by delivering a finer Mean Grain Size sand, will increase the quantity of sand required for delivery to the project.** Correspondingly, a coarser sand delivered than selected on the Bid Schedule will reduce the volume of sand required. The price incentives shall be paid after determining the Average Mean Grain Size of the completed Acceptance Section. Table 1 shows the coarse sand price and quantity incentives.

TABLE 1
COARSE SAND INCENTIVES

	DESIGN BEACH		ADVANCE NOURISHMENT		
MEAN GRAIN SIZE (mm)	52% OF TOTAL QUANTITY	% PRICE INCREASE	48% OF TOTAL QUANTITY	% VOLUME REDUCTION	TOTAL QUANTITY CY
0.30	208,000	0%	192,000	0%	400,000
0.33	208,000	2%	159,360	17%	367,360
0.36	208,000	5%	140,160	27%	348,160
0.40	208,000	8%	126,720	34%	334,720
0.45	208,000	10%	119,040	38%	327,040
0.50	208,000	15%	115,200	40%	323,200
0.55	208,000	19%	113,280	41%	321,280

5. CHARACTER OF MATERIAL

The character of the sand to be supplied by the Contractor shall meet the following physical specifications:

- Composed of quartz and/or carbonate with no more than 20 percent *sand of other mineralogical composition.*

- *The carbonate sand grains allowable under this specification are naturally occuring, durable and solid carbonate grains. Many carbonate grains have excessive internal pore space dramatically reducing the grains density and durability. Carbonate grains*

delivered under this specification shall be 90 percent durable and solid carbonate grains. Internal pore space shall not exceed 10 percent

Whole and broken mollosk shells from the beach environment are durable and solid carbonate grains. Due to the platey nature of shells and shell fragments, no more than 60% of the sand (quartz or carbonate) shall be whole or broken shell.

- Silt content (passing #200 sieve (.074mm)) of less than 5%.

- 99% of material must pass 3/8 inch sieve and shall contain no material larger than the 3/4 inch sieve.

- Average mean grain size greater than or equal to 0.30 mm and less than 0.55 mm.

- Phi Standard Deviation values from 0.50 phi to *1.75 phi.*

- Free of debris, sharp rocks and pebbles, concrete rubble, clay, and organic material.

- Sand color shall be similar to the existing beach. Based on the Munsell Soil Color Chart, color must be within the range:
  HUE of: 2.5 YR, 5 YR, 7.5 YR, 10 YR, 2.5 Y, 5 Y
  CHROMA of: 1, 2, or 3
  VALUE of: 6, 7, or 8.
  This color specification eliminates strongly colored or dark sand.

6. SUBMITTALS

Sand source information that shall be submitted with the proposal is:

1) the name, location and physical address of the proposed sand source;
2) written evidence that the proposed sand source is permitted under local, State, and other authorities, as applicable;
3) a grain size distribution of the proposed sand source as determined and reported by a Certified Testing Laboratory. The grain size data shall supply all information required for grain size distribution data under GRAIN SIZE REPORTING requirements.
4) a 1 to 3 pound sample of the proposed fill material; and
5) evidence that the proposed sand source contains sufficient quantity of acceptable material for the construction of the work.

Samples shall be provided in sealed plastic containers, either jars or bags, clearly marked with the name of the Contractor, the name of the source and any other identifying information.

The submitted grain size distribution data and the sample of the proposed sand source (including its color and texture) shall be representative of the typical nature of the entirety of the proposed sand fill. The Government will retain the submitted documents and samples.

7. SAND FLOODING

If the sand is placed in a state that is not completely saturated by hydraulic placement, the Contractor must saturate the dry placed sand to effect consolidation equal to hydraulic placement. No more than 100 cubic yards of sand at a time shall be placed on the beach without saturating. Enough water must be used to completely saturate the sand, not less than 100 gallons of water shall be available for each cubic yard of sand placement. Run off water shall be controlled so as not to run off the project limits on the upland side and not to run directly to the ocean forming gullies, eroding the fill sand.

8. CALCULATION OF AVERAGE MEAN GRAIN SIZE

The Mean Grain Size and Phi Standard Deviation shall be determined by Method of Moments Statistics calculated from sieve analysis of the proposed sand source. A Certified Testing Laboratory shall perform laboratory testing in accordance with ASTM – D422. The Method of Moments Statistics shall be calculated according to the instructions contained within this section.

Mean grain size and phi standard deviation are statistical measures of the textural character of a sample of sand, corresponding to the mean and standard deviation of a statistically normal population (example: sand grain sizes). Laboratory sieving of sand provides the data for calculation of the mean grain size and phi standard deviation. There are several methods of calculating these statistics. For the purposes of this contract, Mean Grain Size and Phi Standard Deviation shall be calculated by the Method of Moments. The method of calculation is included in this section. The Average Mean Grain Size refers to the average of the Mean Grain Sizes calculated for individual samples sieved in the laboratory. The Average Mean Grain Size shall be used to evaluate price and quantity incentives for this contract.

9. GRAIN SIZE REPORTING

The grain size distribution information shall be based upon ASTM – D422, using U.S. Standard sieve sizes 3/8", 4, 8, 16, 30, 40, 50, 70, 100, 140, 200, 230. All gradation curves shall be submitted on ENG Form 2087, sample appended to this section. All title information shall be filled out with project name, date, sample number, location sample obtained, unified soil classification, percent silt passing the No. 200 sieve (0.074mm), percent silt passing the No. 230 sieve (0.063mm) and Method of Moments Mean Grain Size and Phi Standard Deviation. Each curve shall state what Mean Grain Size class the sample meets, according to the Bid Schedule. A tabulation of the laboratory results of the cumulative percent retained on each sieve by weight shall be provided with each

gradation curve. Samples from the sand source shall be numbered consecutively. Samples from the project site shall be identified with the Acceptance Section, numbered consecutively for each Acceptance section, and a station and range location.

10. CERTIFIED TESTING LABORATORY

Certified Testing Laboratory refers to a geotechnical testing laboratory qualified under ASTM E329-95c standards and certified by AASHTO (American Association of State Highway and Transportation Officials) National Voluntary Accreditation Program; or MMRL (AASHTO Materials Reference Laboratory accreditation; and personnel qualified by NICET (National Institute for Certification of Engineering Technicians).

11. MEAN GRAIN SIZE AND PHI STANDARD DEVIATION CALCULATION USING THE MOMENT METHOD

The equations for calculating the Mean Grain Size and Phi Standard Deviation using the moment method are as follows:

$$\textbf{Mean Grain Size} \quad M = \frac{\Sigma fx}{n}$$

$$\textbf{Phi Standard Deviation} \quad \sigma = \sqrt{\frac{\Sigma (x - M)^2}{n}}$$

Use of these equations to calculate the moment method values is illustrated in Table 2. Column A is the sieve size used, Column B is the corresponding sieve opening in millimeters, and Column C is the sieve opening in phi. The phi values are used in the calculation.

Sieve analysis measures the percent retained on each sieve size by weight (Column D). Column E (x) is the midpoint value in phi between adjacent sieves. Column F (f) is the percent retained by the smaller of adjacent sieves. Column G is the product of Column E and F (x * f). The sum of the values in Column F is n, sum of the percent retained on the smallest sieve used. This value will generally be less than 100%, as some fine material passes through all the screens. The sum of the values in Column G is Σfx, and its division by n produces the mean grain size in phi units of measure. The millimeter (mm) value is calculated as follows:

$2^{-phi} = mm$ Example: $2^{-1.25\ phi} = 0.42$ mm

Columns H and J are used to calculate the Phi Standard Deviation (σ) value of the material. If a sieve size is not used in the testing process it should be completely eliminated from the calculation table.

12. QUALITY CONTROL SAMPLING

The Contractor shall perform sampling that includes no less sample collection than described in the following plan. The Contractor shall conduct all testing in a location

accessible to government inspectors. The Contractor shall include the sampling and testing procedure in his Contractor's Quality Control Plan for government review and acceptance within ten days of notification of acceptance of Bid. The Quality Control Plan shall include the name, address and point of contact for the Certified Testing Laboratory to be used for all grain size analysis. The location of the testing facility to be used for this contract shall also be included in the Quality Control Plan. Gradation test results shall be turned in daily with the daily quality control reports. Each sample collected shall be approximately one pound in weight and obtained from a single location. **All laboratory test results shall be reported to the Government.**

Sampling at the Sand Source

Sand samples for laboratory testing shall be collected at the sand source at the rate of one sample for every 2000 cubic yards of sand to be transported. Sampling and testing shall be completed before the sand is transported to the project site, and shall be representative

Table 2

CALCULATION OF MOMENT METHOD FOR MEAN GRAIN SIZE AND PHI STANDARD DEVIATION

A	B	C	D	E	F	G	H	I
U.S. STANDARD SIEVE	GRAIN SIZE mm	GRAIN SIZE PHI	CUMULATIVE PERCENT RETAINED*	* Cumulative Percent Retained is example results of laboratory sieving of a sand sample. x	f	fx	$(x-M)^2$	$f(x-M)^2$
3/4	19.00	-4.25	0.0%					
				-3.75	0.9%	-0.034	28.084	0.253
3/8	9.51	-3.25	0.9%					
				-2.75	3.8%	-0.105	18.498	0.703
4	4.76	-2.25	4.7%					
				-1.75	4.7%	-0.082	10.901	0.512
8	2.38	-1.25	9.4%					
				-0.75	9.5%	-0.071	5.298	0.503
16	1.19	-0.25	18.9%					
				0.25	10.5%	0.026	1.694	0.178
30	0.595	0.75	29.4%					
				1.00	4.5%	0.045	0.303	0.014
40	0.420	1.25	33.9%					
				1.50	5.3%	0.080	0.002	0.000
50	0.297	1.75	39.2%					
				2.00	9.0%	0.180	0.203	0.018
70	0.210	2.25	48.2%					
				2.50	12.3%	0.307	0.899	0.111

100	0.149	2.75	60.5%					
				3.00	24.8%	0.744	2.098	0.520
140	0.105	3.25	85.3%					
				3.50	10.6%	0.371	3.815	0.404
200	0.074	3.76	96.9%					
				3.88	1.1%	0.043	5.417	0.060
230	0.063	4.00	97.0%					
SUM				n=	97.0%			
SUM				Σ=		1.50		3.276
MEAN GRAIN SIZE (PHI)				M(phi) =		1.55		
MEAN GRAIN SIZE (mm)				M(mm) =		0.34		
PHI STANDARD DEVIATION				σ=				1.84

of the sand being delivered to the project. Each day's samples Mean Grain Size and Phi Standard Deviation shall be averaged and the running average recorded on the gradation curve, along with the individual sample Mean Grain Size and Phi Standard Deviation. A new average shall be started each day. The Average Daily Mean Grain Size shall be used as an indicator for the Mean Grain Size for the sand proposed on the Bid Schedule and being delivered to the project. No individual sample Mean Grain Size shall be less than 0.25 mm. Any materials not meeting the Mean Grain Size requirements shall not be transported to the project site. Any materials not meeting the Contractor's Bid Mean Grain Size delivered to the project site shall fall into the lower Mean Grain Size class, and appropriately more sand shall be delivered.

Sampling at the Project Site

Sand samples for laboratory testing shall be collected at the project site. Sand samples shall represent the fill material only, avoiding existing beach sand below the project fill. Sand samples shall be collected from each beach fill Acceptance Section. Sand samples shall be collected at the rate of one sample representing 500 cubic yards of sand delivered. This represents approximately 100 samples taken per 500 foot Acceptance Section. The samples shall be collected on a regular sampling grid covering the entire Acceptance Section, and the location recorded on the gradation curve. The plan of beach sampling shall be submitted with the Contractor's Quality Control Plan. All sample collection in an Acceptance Section shall be distributed temporally over the entire filling operation. Half of the samples shall be collected during filling of the Acceptance Section, when the fill is approximately less than half of the final grade. The second half of the samples shall be taken from the surface of the completed Acceptance Section. Samples shall not be collected from the surface, but 6 inches below the ground surface. Before an Acceptance Section is surveyed for final payment and accepted by the government, all sample laboratory analyses shall be completed and submitted to the Government. All individual sample Mean Grain Size and Phi Standard Deviation shall be tabulated. The tabulation shall include sample identifying information including Acceptance Section, sample number and date. The Average Mean Grain Size and

Average Phi Standard Deviation for each Acceptance Section shall be calculated from and indicated on the tabulation sheet. The Average Mean Grain Size from the sample analysis for each Acceptance Section shall be compared to the Bid Schedule Mean Grain Size class, and verify that the appropriate quantity of sand has been delivered for the Mean Grain Size of the sand in that Acceptance Section. The survey of the Acceptance Section will verify the quantity of sand delivered. **The total quantity of sand in an Acceptance Section shall match the quantity shown on the Bid Schedule for the Mean Grain Size class of sand indicated by the Average Mean Grain Size of sand delivered to that Acceptance Section.**

13. PERMITS

The Contractor shall be responsible for obtaining all applicable permits for the sand source. As part of the proposal, the contractor shall submit evidence satisfactory to the Government that the sand source to be used for the project is permitted by local, State, and Federal authorities, as applicable. The Contractor is likewise responsible for obtaining all applicable permits and licenses for the transport of equipment and material undertaken as part of the work.

The Government shall obtain permits for the placement of the fill sand along the project beach area. By acceptance of the contract, the Contractor agrees to abide by all applicable conditions of the permits.

14. ENVIRONMENTAL QUALIFICATIONS

GENERAL REQUIREMENTS FOR BORROW SOURCES

It is important that any material to be used for a Dade Co. sand borrow source be considered to be as clean as what exists on Dade beaches or is normally used for playground quality sand. A Phase I HTRW (Hazardous Toxic and Radioactive Waste) Evaluation to meet the requirements of ASTM E-1527-97 shall be performed on the borrow source material. If the borrow site contains HTRW materials or is suspected of containing hazardous materials, fissionable materials, environmental contaminants or otherwise toxic materials it shall not be used as a borrow source. Materials passing these evaluation criteria will be tested as provided below and testing results provided to the Government.

REQUIREMENTS FOR RADIOACTIVE ISOTOPES:

Radiation levels and radioactivity content shall be measured for the borrow material and for beach area. The borrow area and the beach placement area shall be surveyed in a pattern approved by the Government as described below. The background radioactivity and radiation levels (milli-roentgens/hour) of the borrow area vs. the beach site shall be compared. The levels of contaminant (radioactivity content in pico-curies/gram) in borrow material cannot exceed the mean levels existing at the beach placement area. If

radioactivity levels of the source material exceed the mean naturally occurring radiation levels at the beach area, the site shall not be used as a borrow source. These radiological surveys and analysis shall consist of the following:

Radiation surveys are to be taken at the beach and borrow sites. The radiation levels shall be presented in graphical and tabular form. These surveys shall be taken at waist level. Additionally, samples from the beach and borrow site shall be analyzed for radioactivity levels and be reported in pico-curies per gram. The measurements shall also fall within _1_ standard deviation or suspect high values will be determined to be the most conservative representation of the results. The results of the radioactivity (pico-curies per gram) shall be reported in graphical and tabular form.

The resulting beach background radiation level shall not be increased by more than 20 micro-roentgens/hr. This is to be determined by gamma radiation surveys (with the probe at waist level) taken both before and after the beach material placement.

Gamma spectroscopy analysis for Radium 236 shall be performed at the beach site and at the potential borrow site. The placement of borrow material shall not allow the resulting composite radioactivity at the beach (determined by the gamma spectroscopy) to increase by more than 5 pico-curies/gram.

Methodology for radioactivity content to be used for individual sample analysis shall be EPA method 9310 for alpha and beta emissions.

Methodology for Gamma Spectroscopy analysis shall be EPA method----------

The Contractor shall provide reports to the Government demonstrating their evaluation of the above criteria and provide all data including all radiation values taken.

REQUIREMENTS FOR ENVIRONMENTAL CONTAMINANTS

The Contractor shall provide reports to the Government demonstrating their evaluation of the below criteria and provide all data including all chemical values determined. The data shall be provided in graphical and tabular format. It is anticipated that background level of contaminants for Dade County beaches is essentially zero or below detection limits. Should contaminants be detected in borrow material the levels of contaminant in borrow material cannot exceed the mean levels existing at the beach placement area in samples taken as described below. These measurements will consist of the following chemical testing of the borrow material and elutriates;

Total Recoverable Petroleum Hydrocarbons (TRPH), EPA 9071A or EPA 8440

Heavy metals (As, Ba, Cd, Cr, Hg, Pb, Se), EPA method 3051 (Use graphite furnace method for each metal except Hg which has own method)

Volatile Halogenated Organics (Cl-, Br-), EPA method 8021A

Polycyclic Aromatic Hydrocarbons (BTEX), EPA method 8021A

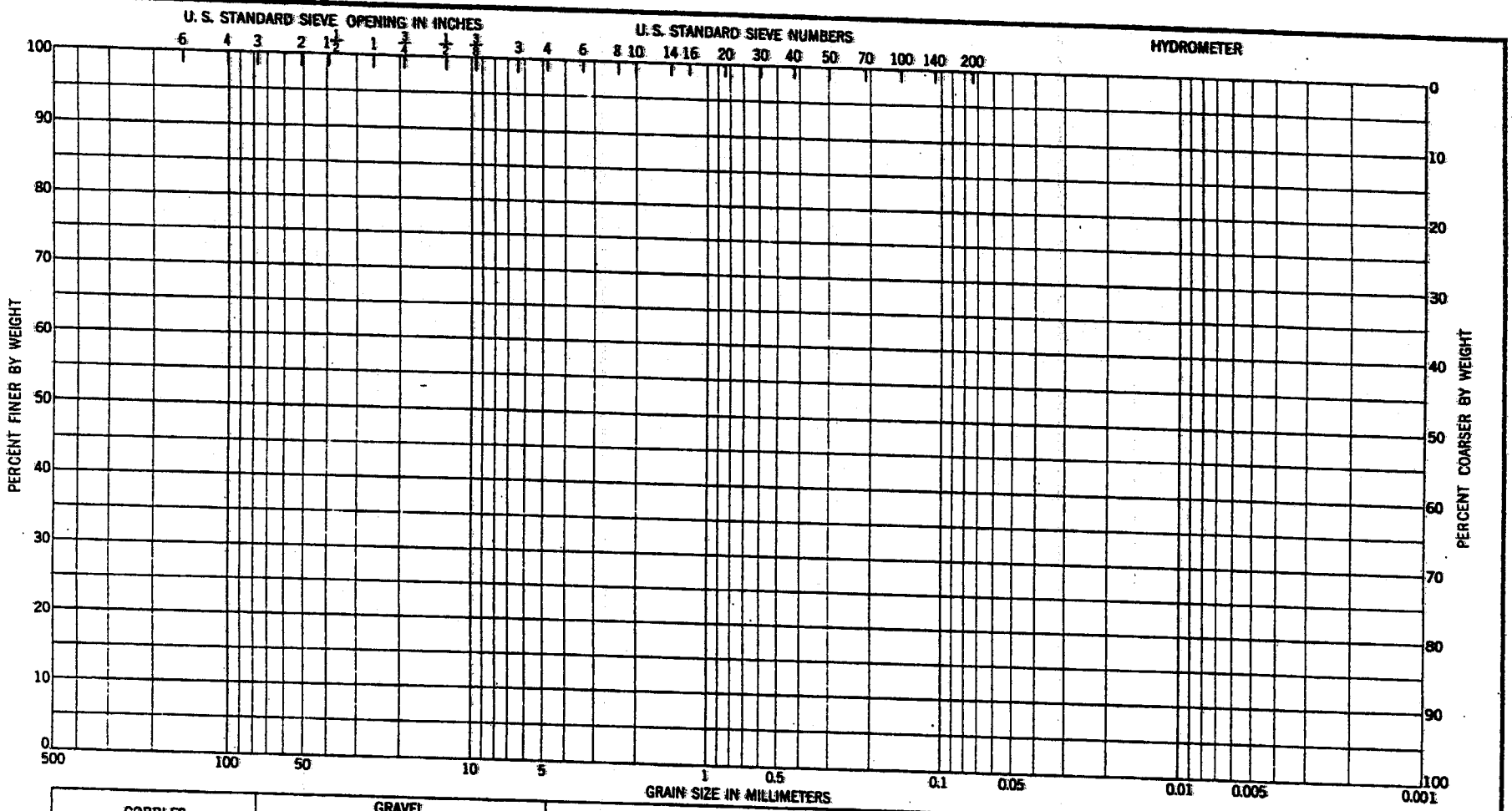
Elutriate Preparation shall be by the method provided in EPA/CE 81-1. Testing for all above contaminants shall be performed on elutriates.

If contaminant levels of the borrow material exceed the mean naturally occurring contaminant levels at the beach area, the site shall not be used as a borrow source. The measurements shall also fall within _2_ standard deviation or suspect high values will be determined to be the most conservative representation of the results. Elutriate values shall be compared to State Water quality standards to determine whether runoff will violate State standards.

SAMPLING LOCATIONS FOR ENVIRONMENTAL CONTAMINANTS

Samples to be taken for the above requirements shall be taken every 1000 feet as needed in the beach placement area, for representative beach quality samples, and in spots considered to be representative of every 50,000 cubic yards of the borrow material. Representative samples from all sites shall be taken in a pattern and locations approved by the Corps.

APPENDED TO SECTION:
GRADATION CURVE, ENG FORM 2087



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI

GRADATION CURVES

Project

Area

Boring No.

Date

ENG FORM 1 MAY 63 2087